Northern Idaho Forest Resources and Industries

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Northern Idaho Forest Resources and Industries

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NORTHERN ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

FOREST SERVICE

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The Forest Survey

DEPENDABLE information on the supply of all raw materials is vital to the conduct of the war and to the success of present efforts at post-war planning. This economic survey of an integral part of the Nation's reservoir of raw material—our forests—and of the industries dependent upon them, is essential to a complete understanding of resource potentialities. The data presented result from the first Nation-wide field inventory ever to be made of the volume, quality, and species of the timber resource, undertaken primarily as an essential contribution to the national social and economic welfare in peacetime. The rapidly changing conditions of our economic and social life since the second world war began have not lessened the need for publishing the facts already gathered and the conclusions to be drawn from them.

The Nation-wide Forest Survey, authorized by the McSweeney-McNary Forest Research Act of May 22, 1928, has undertaken the task of obtaining facts essential to a system of planned forest-land management and use for each of the States and forest regions, and for the Nation, and through analysis thereof is aiding in the formulation of guiding principles and policies fundamental to permanent forest-land use.

The fivefold purpose of the Forest Survey is: (1) To make a field inventory of the present supply of timber and other forest products; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which it is being diminished through industrial and domestic uses, windfall, fire, disease, and other causes; (4) to determine the present consumption and the probable future trend in requirements for timber and other forest products; and (5) to interpret and correlate these findings with existing and anticipated economic conditions, as an aid in the formulation of both private and public policies for the effective and rational use of land suitable for forest production.

The plan has been to publish the results of this investigation as they become available. Necessarily, the data presented apply to large areas and should not be interpreted as portraying correctly the forest situation for small sections, the condition of which may be either better or poorer than the average for the entire unit or State. They supply the general background for the intensive study of critical situations. As might be expected, the recommendations included in these reports are adapted to the long-time character of timber growing and presuppose normal peacetime conditions. Any that are out of line with war requirements are obviously in abeyance for the present.

This investigation is conducted in the various forest regions by the forest experiment stations of the Forest Service and in Idaho by the Northern Rocky Mountain Forest and Range Experiment Station with headquarters in Missoula, Mont.

RAYMOND D. GARVER,
Director, Forest Survey.

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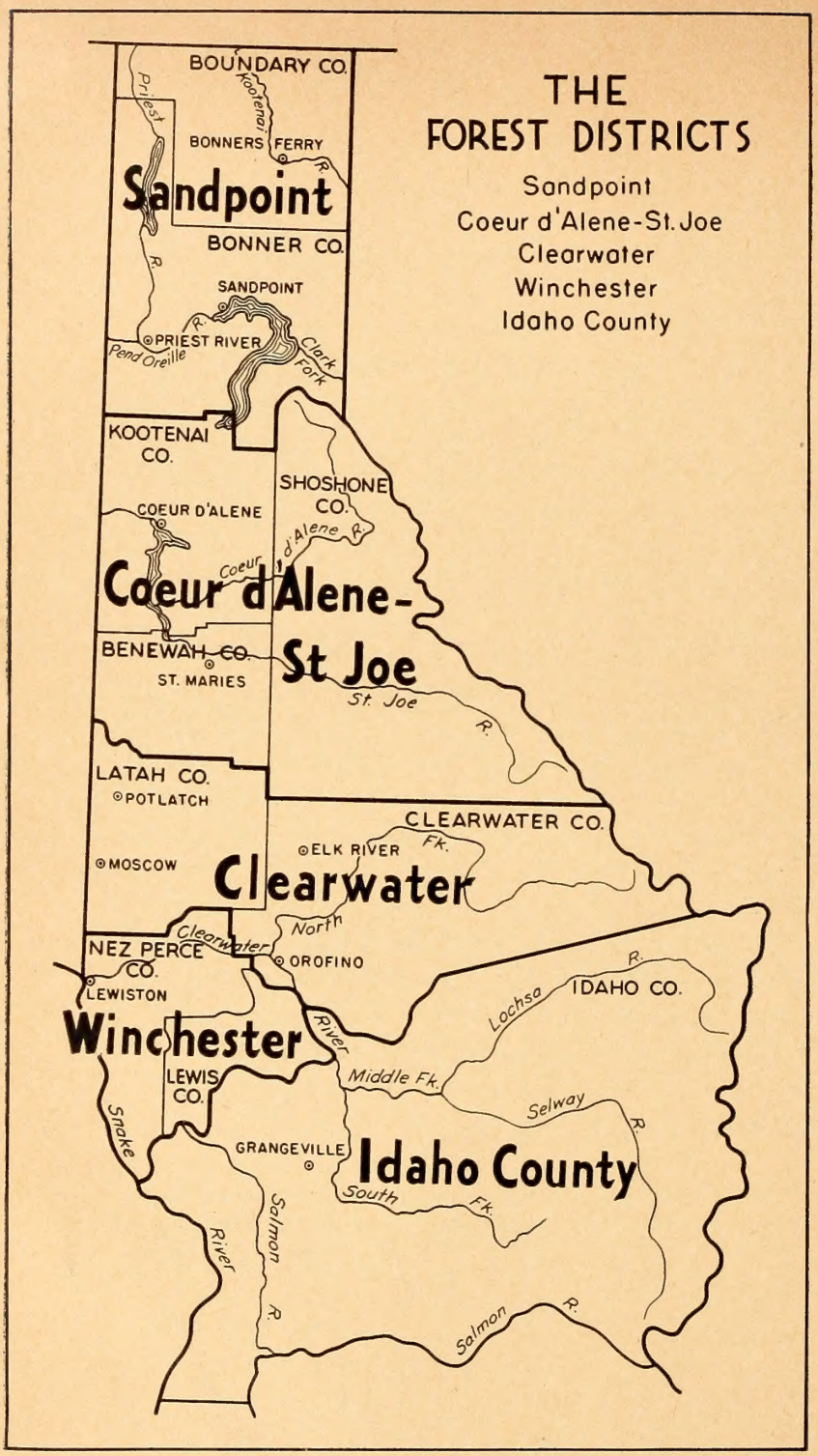

FIGURE 1.—*Northern Idaho, showing counties, cities, drainages, and forest districts.*

Introduction

Highlights of the Situation

NORTHERN IDAHO, separated from southern Idaho by natural barriers, chief of which is the very deep canyon of the Salmon River (fig. 1), is a comparatively distinct unit of 12.5 million acres making up the "panhandle" of the State. It includes nine complete counties and the greater portion of Idaho County, which lies partly south of the Salmon River. That the forests in this region constitute an outstanding natural resource is well illustrated by a comparison of the proportionate area of forest with that for the United States as a whole (fig. 2). The 10.3 million acres of forest land in northern Idaho amounts to approximately four-fifths of the total area.

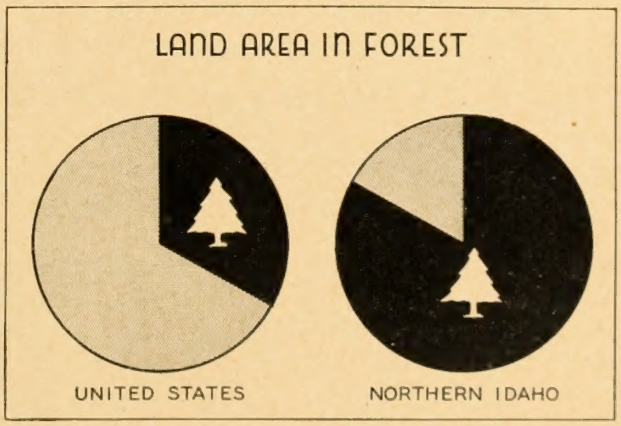

FIGURE 2.—*In northern Idaho 4 acres out of 5 are forest, compared with 1 acre out of 3 in the United States as a whole.*

During the period 1935–38, 6,000 workers on the average were employed in the major local timber-products industry, lumbering. This is a rather small number in comparison with the forest acreage, and yet, because of the forest situation in this region, it will in the future be difficult and perhaps impossible to maintain a permanent industry of even this small size. The nature of the forest resource accounts in part for this. Approximately 3.4 million acres of the forest is noncommercial. Of the remaining 6.9 million acres, only 2.4 million support western white pine stands. Out of 38 billion board feet of saw timber in sawlog stands, only one-fourth, or 10 billion board feet, is western white pine. These figures are significant because 73 percent of the lumber and 56 percent of all the timber cut is of this species. The remaining three-fourths of the timber consists of species currently considered so low in the utility scale that it is difficult to market them profitably in distant consuming centers.

The present allowable cut of western white pine (i. e., permissible cut under a system of sustained-yield forestry) is 140 million board feet yearly, as compared to an average cut of 351 million board feet in the years 1935-38. This can be increased in the future with proper management. Even so, unless the cut of secondary species is increased, the forest industry which can be supported in the future will be much smaller than the present one. With no other place for the residents of northern Idaho to turn, the real goal is continuation of the industry on the present level. If the markets could absorb all species up to the amount that can be produced, little or no decline would be necessary. The average annual cut of all species (except cedar poles) in northern Idaho has recently been 580 million board feet. The present allowable cut is 518 million board feet; but this could be increased somewhat with proper management. The soundest approach to the utilization problem lies in fixing the white pine cut at the highest possible stable level, at the same time attempting to broaden the outlet for the less marketable species.

These forests are among the most inflammable in the United States. Fire losses in both mature and immature stands during the period 1931–37 reduced the sustainable cut by about 26 million board feet of white pine yearly. At this rate, in each century a full 18 years of harvest would be reaped by fire. Even though the recent fire record of both private and public protective agencies has been good in general, the losses need to be reduced even further on the areas given intensive protection, and such protection must be extended to the still large area now inadequately covered.

The cost of guarding these forests comes high, particularly on national forests. If roads and other improvements necessary for fire control are considered, the annual charge against fire protection on the national forests is 21 cents an acre. In addition to fire-control work, disease and insects must be fought. The blister rust disease is particularly a problem, for unless controlled it threatens to eliminate the white pine as a commercial crop. It is estimated that initial control of the disease will ultimately

cost $19,000,000. Because of the great values at stake fire protection is something which cannot be done without, and blister rust control is almost as essential.

Of the commercial forest, 39 percent, including 45 percent of the commercial white pine, is privately owned. The management of private land constitutes the biggest forest problem in northern Idaho. The timber operator is faced with such heavy protection charges, high risk, and inequitable taxation as to make the practice of forestry of doubtful permanence. In many cases, his sawmill is larger than his forest can support. He is not able to log at a profit more than a small part of the abundant resource of secondary species. These facts tend to make liquidation a far more attractive proposition than a permanent timber business. But, most important of all for the virgin forest with its high proportion of saw timber, the advantages of quick "cashing in" exceed any case which can be built for permanent forestry. Several of the contributory factors may change, but the present outlook for private forestry on a very large part of the area is not bright.

The situation with regard to the State-owned forest land is, at present, only slightly more satisfactory. Nine percent of the commercial forest, including 18 percent of the white pine saw timber, is owned by the State. Despite the importance of this timber area, it is not yet managed on a perpetual-cut basis. On the other hand, the national forests are being operated on such a basis. They occupy 47 percent of the commercial forest area and include 36 percent of the white pine saw timber.

Although there may be some difference of opinion regarding the major factors contributing to the local forest situation and even wider difference as to the remedies, the general objectives of forest-land management seem fairly clear. Forest-land management should make its maximum contribution to the welfare of the people—not trees for trees' sake, but trees for the greatest social good. The threefold local problem, therefore, is (1) to furnish adequate raw material to stabilize forest industries and communities at the highest possible level; (2) to afford the maximum protection to the vast watershed, in retarding water runoff and reducing erosion; and (3) to make the most of recreational opportunities offered by wooded areas.

The most serious phase of this problem is the necessity for making the timber furnish a permanent substantial income to the people of northern Idaho. This area already has had communities dislocated and people stranded because of the crumbling of the lumber industry beneath them. This report is concerned primarily with ways of making the forests return the maximum income to the local people. Although watershed protection and forest recreation receive less emphasis in the following pages, their great social and economic importance is also recognized.

Realism is the zone of hard common sense separating defeatism from unwarranted optimism. It is the intent of this report to stay within that zone. No aspect of the forest problem is insurmountable if the need and desire are sufficiently great, but no very satisfactory outcome may be expected unless an aggressive effort is made to solve the problem. It is not possible at this time to advance the complete solution, but from the marshaling of the facts in their proper relation to each other a clearer understanding and a sounder action can develop.

A reasonable compromise between theory and practicality in the northern Idaho situation would be:

1. To increase the effort to make permanent private forestry possible through greater public cooperation with the private owner.

2. To insist that all forest lands be so handled as to keep them in a productive condition. In some cases this will mean a tightening of regulations affecting the private operator.

3. To accept the fact that the present heavy cutting of privately owned western white pine saw timber will probably continue over much of northern Idaho, and to act accordingly.

4. To hold back the sale of publicly owned western white pine saw timber as much as practicable, but to develop cooperative sustained-yield units wherever feasible.

5. To push State or Federal acquisition of forest lands which are definitely unsuited for private ownership.

Methods of the Survey

The timber and land inventory of northern Idaho was begun in 1932, and within 5 years the field work was completed. Wherever obtainable, private and public information on the condition, species, and volume of timber was checked, and adjusted to Forest Survey standards. Areas of merchantable timber not so covered were cruised by the line-plot method, or "washed in" with adjacent cruised areas, or the volumes were determined by ocular estimate. Whether the first or one of the latter two methods was used depended upon the value of the timber.

Type maps were made for the entire area. Field men covered the country systematically, demarcating the nonforest land from the forest land, commercial forest land from the noncommercial, the western white pine type from the ponderosa pine type, and so on into many classifications. The finished product for each township was a map showing the boundaries of the types and the forest type, age, stocking, size class, site quality, and board-foot volume of each stand. From this information, the volume and area inventory estimates summarized in this report were compiled.

Growth estimates were computed from normal-growth tables adjusted to actual stand conditions on the basis of a growth study made in 1937–38 that included the measurement of the preceding 20-year growth on 272 one-fifth-acre sample plots established in representative areas.

Special field studies and analyses of fire reports were made to determine the rate of loss by fire and insects. Estimates of the drain from timber cutting were prepared with the aid of annual and biennial timber-product census figures supplemented with special studies. A special canvass of wood consumption gave the basis for estimating timber-product needs.

Written during peacetime, this publication in general portrays the situation prior to 1941. Statements regarding current conditions must be interpreted accordingly.

Explanation of Terms Used

Commercial and Noncommercial Lands

Commercial forest is defined as land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting. Noncommercial forest includes (1) land capable of producing commercial timber and economically accessible, now or prospectively, but withdrawn from timber use, and (2) land chiefly valuable for purposes other than timber production; namely, subalpine and other forest land which, because of low productivity or extreme inacessibility, appears to be permanently out of the commercial timber-producing class.

Forest Types

Stocked Commercial Forest Land

Stocked commercial forest land comprises areas with at least 3 or 4 M board feet of saw timber per acre, or more than 10 percent stocked with poles, seedlings, or saplings. Such stands are grouped into 10 forest types as follows:

Western white pine.—Stands containing 15 percent or more by volume of western white pine. This type is given priority over all others. The minimum volume for a saw-timber stand is 4 M board feet per acre.

Ponderosa pine.—Stands containing 25 percent or more of ponderosa pine. This type ranks next in priority to western white pine. The minimum volume for a saw-timber stand is 3 M board feet per acre.

Larch-Douglas-Fir.—Stands containing 10 percent or more of western larch and 75 percent or more of larch and Douglas-fir combined. The minimum volume for a saw-timber stand is 4 M board feet per acre.

Hemlock-grand fir.—Stands containing 50 percent or more of western hemlock or grand fir, or both. The minimum volume for a saw-timber stand is 4 M board feet per acre.

Douglas-fir.—Stands containing 60 percent or more of Douglas-fir and less than 10 percent of larch. The minimum volume for a saw-timber stand is 4 M board feet per acre.

Engelmann spruce.—Stands containing 50 percent or more of Engelmann spruce. The minimum volume for a saw-timber stand is 4 M board feet per acre.

Lodgepole pine.—Stands containing 50 percent or more of lodgepole pine. The minimum volume for a saw-timber stand is 3 M board feet per acre.

Western redcedar.—Stands in which western redcedar predominates. The minimum volume for a saw-timber stand is 4 M board feet per acre or 8 cedar poles per acre.

Cedar-grand fir.—Stands in which western redcedar and grand fir predominate. The minimum volume for a saw-timber stand is 4 M board feet per acre or 8 cedar poles per acre.

Cottonwood.—Stands in which northern black cottonwood predominates. There is no minimum volume for a saw-timber stand; the majority of the dominant trees must be of saw-timber size.

Nonstocked Commercial Forest Land

Nonrestocked cut-over.—Unimproved, logged areas which at the date of mapping averaged less than 3 or 4 M board feet per acre, and were less than 10 percent stocked with poles and/or seedlings and saplings.

Nonrestocked burn.—Unimproved lands deforested by fire and not restocked at time of mapping.

Size Classes

Saw-timber stands.—Stands with a minimum of 3 or 4 M board feet (depending upon forest type) of saw-timber volume per acre. Western white pine, ponderosa pine, lodgepole pine, western redcedar, and cottonwood trees 11 inches d. b. h. and larger are classed as saw timber. For the other species, trees 13 inches and larger are classed as saw timber.

Pole stands.—Stands in which most of the dominant trees are from 5 inches d. b. h. to saw-timber size.

Seedling and sapling stands.—Stands in which most of the dominant trees are under 5 inches in diameter.

Ownership Classes

Large private.—This class includes for the most part the forest holdings of those individuals and concerns owning more than 1,000 acres of forest land.

Small private.—This class includes for the most part the forest holdings of those individuals and concerns owning less than 1,000 acres of forest land.

State.—The forest holdings of the State of Idaho.

County.—The forest holdings of the 10 counties.

Indian reservation.—The forest area held in trust for the Indians.

Public domain.—Federal forest area unreserved for any special purpose.

National forest.—Federal forest area managed by the Forest Service of the Department of Agriculture.

Water-power reservation.—Public domain or national-forest land on which the water-power rights have been reserved.

Common and Scientific Names of Species

TREES

Cottonwood, northern black	*Populus trichocarpa hastata*
Douglas-fir	*Pseudotsuga taxifolia*
Fir, alpine	*Abies lasiocarpa*
Fir, grand	*A. grandis*
Hemlock, mountain	*Tsuga mertensiana*
Hemlock, western	*T. heterophylla*
Larch, western	*Larix occidentalis*
Pine, lodgepole	*Pinus contorta*
Pine, ponderosa	*P. ponderosa*
Pine, western white (Idaho white pine)	*P. monticola*
Pine, whitebark	*P. albicaulis*
Redcedar, western	*Thuja plicata*
Spruce, Engelmann	*Picea engelmannii*

WILD CURRANTS AND GOOSEBERRIES

Currant, Colorado	*Ribes coloradense*
Currant, maple leaf	*R. acerifolium*
Currant, prickly	*R. lacustre*
Currant, sticky	*R. viscosissimum*
Currant, western or wild black	*R. petiolare*
Currant, wild red	*R. triste*
Gooseberry, inland black	*R. irriguum*
Gooseberry, white stemmed	*R. inerme*

Description of Northern Idaho

Physical Characteristics

NORTHERN Idaho is rich in physical contrasts (fig. 3). On the west lies the fertile prairie of Washington and Oregon and on the east the generally mountainous country of western Montana. Its principal geographic feature is a series of rugged mountain ranges extending lengthwise of the "panhandle." The ridge of the Bitterroot Mountains, at elevations between 6,000 and 9,000 feet above sea level, follows the eastern boundary as far north as Pend Oreille Lake. Along the southern boundary is a high plateau dropping off in sharp breaks to the Salmon River, a mile below in some places. Sloping generally westward and northwestward from the steep and rugged mountains of the Montana line and the Salmon River plateau, the land grades into rounded hills and then the rolling prairie lands of the famous Palouse farming country at elevations of 2,000 to 3,000 feet. The reader unacquainted with this region can obtain an essentially correct picture by thinking of it as a westward slope grading from mountain peaks to prairie, with the wide local variations in altitude that are common to mountainous country.

North of Pend Oreille Lake, a series of ridges separates

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FIGURE 3.—*The wealth of contrasts in northern Idaho is indicated in this view from Salmon Mountain on the Bitterroot National Forest looking east to the Bitterroot Mountains. From high ridges and peaks 6,000 to 9,000 feet above sea level, the country drops westward to 700 feet along the bottom of the Snake and Clearwater River Canyons, changing from steep and rugged mountains to rolling prairies containing some of the finest farm land in the United States, and from stunted and twisted alpine timber to magnificent virgin western white pine stands with 8-log trees.*

FIGURE 4.—*From the high forests along the Bitterroot Mountains the country slopes westward to a rolling prairie which sweeps into Washington and Oregon. This prairie is, in general, highly productive and given over to grain and pea farming. In this view, taken in the heart of the famous Palouse country, the outer flank of the forest, a belt of ponderosa pine, is discernible in the background. Moscow is in the upper center. Courtesy of 41st Division Aviation, Washington National Guard.)*

several broad valleys which were originally almost completely forested but which now contain a considerable area of land cleared for agricultural use. The rivers of northern Idaho all drain into the Columbia.

A close relationship between elevation and climate is indicated by the available data. The average precipitation at each of five weather stations scattered through the mountainous territory varies between 32 and 49 inches per year,[1] but most of these stations are in valleys, whereas the heaviest fall of rain and snow occurs on the slopes above. Along the high eastern boundary of northern Idaho the average annual precipitation is probably well above 40 inches, but by contrast, at seven points in or bordering the prairie section it is only about 25 inches. There are also differences in temperature, the prairie stations averaging somewhat warmer than the valley and slope stations during all seasons. In general, the weather in northern Idaho is hot and dry in the summer and relatively cold in the winter when most of the precipitation occurs.

The effects of climate and topography are directly apparent in the natural vegetation. Proceeding westward from the higher elevations in that portion of the area lying north of the Clearwater River, the vegetative cover changes from subalpine forest stands to stands of western white pine and associated species, to ponderosa pine stands, and finally to grassland (see colored map at end of report). South of the Clearwater River is a similar gradation of forest types from the high, moist, and cool back country to the lower, drier, and warmer prairie lands (fig. 4), but here the western white pine is of only occasional occurrence.

Northern Idaho, although only about one-fourth of the State, includes 12.5 million acres of land area or 19,500 square miles—a greater area than New Hampshire and Vermont combined. Of this, 83 percent is forest land and 17 percent nonforest (table 1). Most of the nonforest area is improved farm land and natural grassland found mainly along the western margin. Cleared farm

[1] HAIG, I. T., DAVIS, K. P., and WEIDMAN, R. H. NATURAL REGENERATION IN THE WESTERN WHITE PINE TYPE. U. S. Dept. Agr. Tech. Bul. 767, 99 pp., illus. 1941.

FIGURE 5.—*The agriculture, mining, forest, and railroad industries, and Federal work projects represent the principal sources of income for northern Idaho. To a large extent the workers in other industries are indirectly supported by these basic industries.*

lands dot the settled portions of the forest belt shown on the type map, although most of the individual clearings are too small to show.

Economic Structure

The business structure of northern Idaho is closely tied to that of western Montana and northeastern Washington. These three areas together make up the region known in the West as the Inland Empire. Except for political ties, the common interest of northern Idaho with the rest of the Inland Empire is even stronger than it is with the southern part of Idaho. Industry and commerce in northern Idaho are keyed to those of Spokane, Wash., the nerve center of this region.

Every one of the 45 groups into which the Bureau of the Census classifies all industries is represented to some degree in northern Idaho, but 5 of them may be regarded as the basic sources of income in this area—agriculture, mining, forest industries, the railroads,[2] and public emergency work. The workers in these 5 industrial groups represent about 55 percent of the gainfully employed, and the income from these industries indirectly supports the majority of the workers in the other industries.

In a very real sense northern Idaho lives on its natural resources. The principal activities of its people are centered on extracting raw materials from farm lands, forests, and mines. It is essentially a rural community with no large cities, no important trade centers, and hardly more than enough manufacturing to reduce the raw materials to a transportable form and bulk. Because it leans heavily upon extractive industries and shares little of the wealth created by the manufacture of its raw materials into finished products, the economy of northern Idaho leaves much to be desired.

The 1940 population census presents a cross section of a labor force of 52,000 workers as of the week of March 24–30, 1940, which is highlighted in figure 5.

[2] Northern Idaho is crossed by three transcontinental rail systems: The Chicago, Milwaukee, St. Paul and Pacific, the Northern Pacific, and the Great Northern. Since they are primarily east-west lines rather than local carriers, it seems fitting to consider them as basic sources of income as far as northern Idaho is concerned.

TABLE 1.—*Land area classified according to land use, 1939*

Land use	Land area	
	1,000 acres	*Percent*
Forest:		
Commercial	6,867.4	54.9
Noncommercial	3,462.4	27.7
Total	10,329.8	82.6
Nonforest:		
Cultivated, pasture, and grass	2,100.1	16.8
Town sites	17.5	.1
Brush	14.1	.1
Barren	49.4	.4
Total	2,181.1	17.4
All uses	12,510.9	100.0

FIGURE 6.—*Two extremes in cut-over land farming. A, A prosperous [illegible] in Montana's Flathead County [illegible] farming land has been cleared of the ponderosa pine forests. (Photo courtesy 41st Aviation Division, Washington National [illegible] of Priest River in a western white pine country generally unsuited for agriculture. While [illegible] farms may be quite adequate as homes, but for many this outstate employment [illegible] problem resulting from submarginal agriculture.*

Here the true importance of agriculture and forestry is greatly diminished, because of the marked fluctuations in employment in these two fields, the slack season falling in March in both cases.

Agriculture

In terms of employment, farming is the principal industry in northern Idaho. The 2.1 million acres of cultivated and other improved land and natural grass land shown in table 1 does not represent the full acreage utilized by farmers, since a large area of forest land is used for grazing of livestock. The estimate of March 1940, showing only 10,300 persons engaged in farm work, is considered unreliable because of having been made in a slack season. The doubt is supported by the fact that the 1929 census indicated more agricultural workers—12,700 in fact—and fewer farms.

The first permanent settlers in this region were prospective farmers, establishing themselves in the 1860's and 1870's on the fertile prairie land extending into northern Idaho from eastern Washington and Oregon. When the settlement of these rich lands, lying principally in Latah, Nez Perce, Lewis, and Idaho Counties, reached the saturation point, farming spread, mostly after 1900, into the cut-over forest lands (fig. 6) to the east and north. The agriculture of these cleared farms is predominantly diversified, in contrast to a heavy concentration on grain and peas on the prairie farms.

In 1880 there were some 400 farms in northern Idaho, as compared to 9,000 in 1930 and 10,500 in 1940. The heavy influx of farmers between 1930 and 1940 came chiefly from the drought-stricken regions east of the Rocky Mountains. This recent expansion has drawn attention to a problem directly concerning the forester. In certain instances land clearing creates a liability rather than an asset, since some of the land which has been and is being laboriously divested of trees and stumps is unfit for agriculture.

The development of cheaper and quicker land clearing through the use of the bulldozer (a blade-pushing tractor) for stump pulling has undoubtedly increased the area which it is feasible to develop for farming. So also has the present trend of government aid in land clearing. However, agricultural technicians state there is probably very little good land outside of present farms which is available for new farm development.[3] No estimates appear to have been made on the proportion of the present farm population that can be permanently supported on a satisfactory level at farming. This depends on the possibilities of part-time agriculture and other factors which are difficult to evaluate.

[3] United States Bureau of Agricultural Economics. cut-over land of northern idaho. Migration and Settlement on the Pacific Coast Rpt. 5, 34 pp., illus. 1941. [Processed.]

It is perfectly clear, however, that some of the areas now being farmed are definitely unsuited for agriculture and that, from a social as well as a forestry angle, it is desirable to determine these areas as quickly as possible and turn them back to their proper use.

Mining

Mining in northern Idaho is virtually conterminous with the Coeur d'Alene mining district. Occupying a comparatively small area in the vicinity of Kellogg, Mullan, and Wallace, this district is one of the principal producers of nonferrous metals in the United States. It leads the Nation in silver production and ranks high in the production of lead and zinc. The development of the mines here began early in the 1880's and ever since mining has been a stable industry. It dipped sharply during the depression years but has since returned to its previous level. With northern Idaho suffering from the effects of a declining lumber industry, this recovery has been most fortunate. In 1937 the value of the silver, lead, zinc, gold, and copper produced in northern Idaho was approximately $34,000,000. In each of the years 1938 and 1939 it amounted to $24,000,000. If all of the mining operations in other parts of northern Idaho are included, approximately 5,600 persons were employed in this industry at the time of the 1940 census.

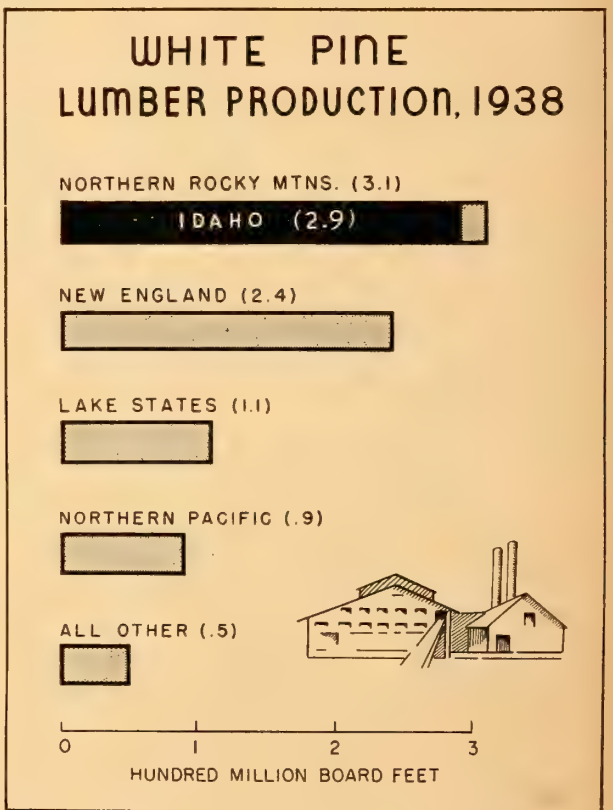


Figure 7.—*Northern Idaho is the principal source of white pine lumber in the United States.*

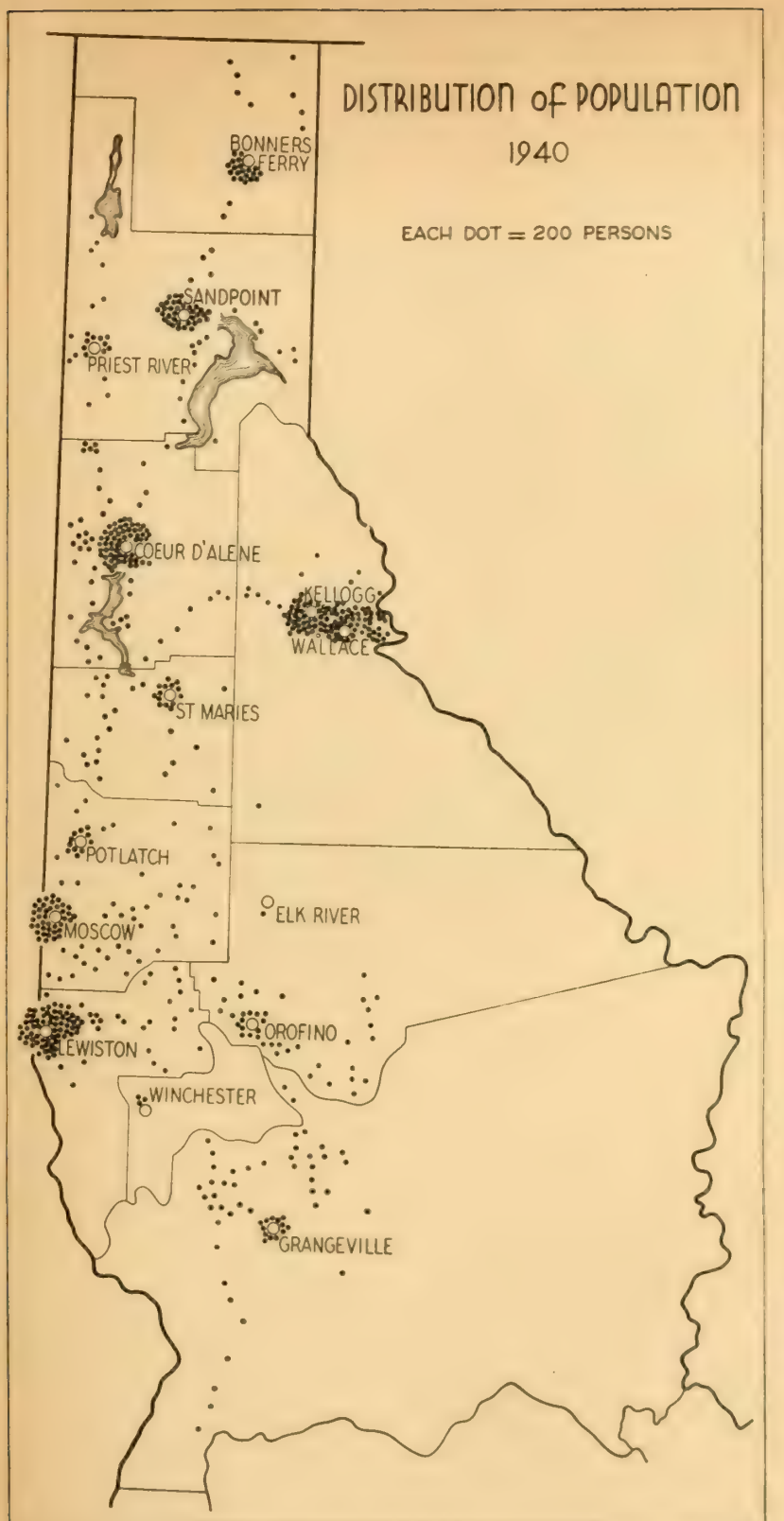


FIGURE 8.—*The 136,000 people in northern Idaho are concentrated principally in a few counties.*

Forest Industry

The classification "forest industry" includes northern Idaho's well-known lumber industry (fig. 7), the "cedar" pole and other forest-products industries, fire protection organizations, and all other forest activities.

From the standpoint of employment, forest industry ranks about on a level with mining. Although only 4,800 persons (fig. 5) were employed in the forest industries in the slack season of 1940, more than 6,800 persons were so engaged during the preceding October. The latter figure represents the workers in the timber products industries as reported in the 1939 census of manufactures. Also, many of the individuals classified as engaged in emergency work are actually occupied in the forests.

The period since 1929 has been marked by a general decline of the lumber industry. However, this is partly counteracted by the greater number of workers employed by the Federal and State Governments in forest work. Besides that, reduced production in many cases has resulted in shorter working periods rather than proportionally fewer workers.

Forest industry and agriculture are closely allied in this area. A great number of farms, particularly those cleared from cut-over lands, are not self-sustaining. Of the farm operators reporting in the 1940 census, 48 percent stated that they had supplemented the farm income by 1 or more days' work off their own farms during the preceding year. These operators spent an average of 122 days each in outside work, and for 90 percent of them the principal outside employment was nonfarm. Although the statistics stop short of indicating the industries furnishing this employment, there is little doubt that much of it was in some type of forest work.

Railroads

With the construction in 1883 of the Northern Pacific Railroad, northern Idaho had its first railway service. This was a major factor in speeding the settlement of the

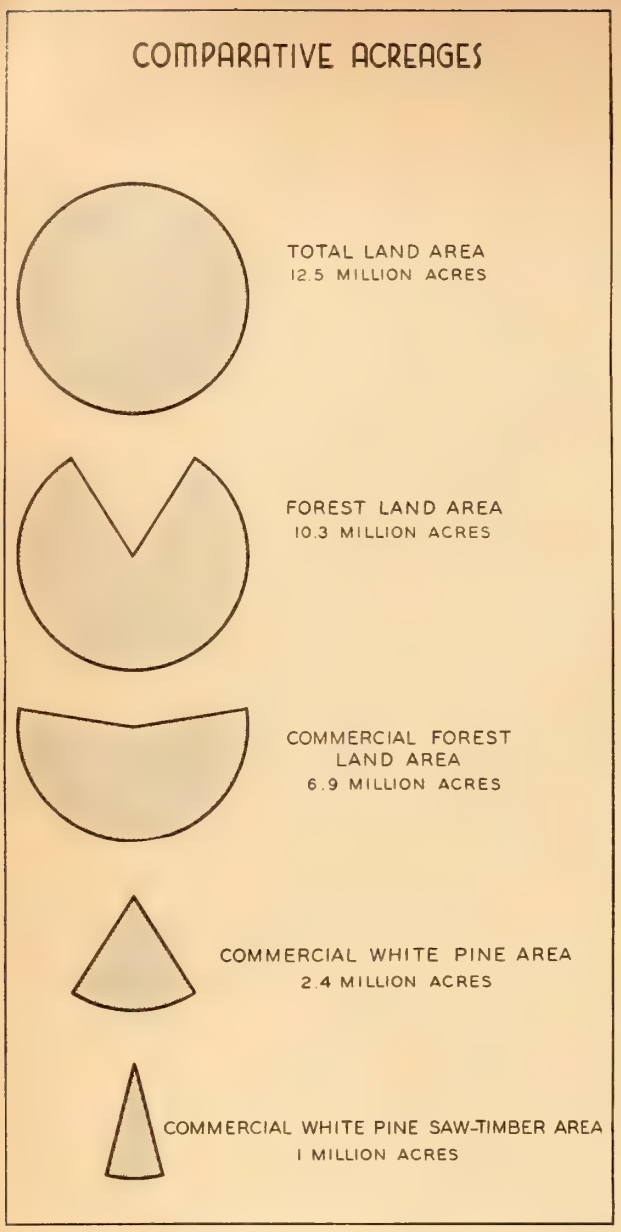


FIGURE 9.—*While 55 percent of northern Idaho is commercial forest land, only one-third of this commercial area, or 2.4 million acres, contains western white pine stands.*

country. Extension of the rail system proceeded at a rapid pace until 1910, when the Milwaukee line began operation. The railroads have 1,270 miles of track in northern Idaho, of which 930 miles is in the systems of these 2 roads and the Great Northern. As shown in figure 5, about 1,000 persons received their principal employment from this source in 1940.

Population

The population of the 10 counties in northern Idaho was 120,000 in 1930. Although the number of persons declined in certain localities, the total increased to 136,000 in 1940. Most of the inhabitants, numbering about 7 per square mile, are located in the principal agricultural areas or in the vicinity of lumbering or mining towns (fig. 8). Three-tenths of the population (1940 census) resides in the six larger incorporated towns, which in order of size are Lewiston (10,548), Coeur d'Alene, Moscow, Sandpoint, Kellogg, and Wallace (3,839). These six are the only towns having populations exceeding 2,500 persons.

Forest-Land Values

Every acre of the 10.3 million acres of forest in northern Idaho plays a part in watershed protection, and many have a real recreation value. A great portion, however, must be discounted in measuring commercial significance for timber products (fig. 9). One-third has no commercial value whatsoever. An additional four-tenths is of only limited present importance from a commercial timber standpoint, and will continue so unless economic conditions change considerably. Thus, for proper appraisal of the forest-inventory situation in northern Idaho one must carefully consider these factors, recognizing that species and location of timber are as important as quantity.

Timber Values

Area Classification

The two broad classifications of forest land have already been indicated in table 1—the 3.4 million acres that are of no commercial value, and the 6.9 million acres having some present or potential value.

Forests classified as noncommercial for timber production are of three general kinds—scrubby subalpine stands, timber of commercial quality so remote as to be now and always commercially inaccessible, and timber of commercial quality which is economically accessible but more valuable for other use and therefore reserved from cutting, as follows:

	Million acres
Noncommercial forest land:	
Subalpine and rocky noncommercial	1.5
Commercial quality but inaccessible	1.7
Commercial quality and accessible but reserved	.2
Total	3.4

The commercial forest land represents a broad scale of values. This variation arises from correspondingly wide differences in the value of individual species. This is a factor in the discussion to follow that must be properly evaluated.

Northern Idaho is far removed from the principal markets. Western white pine lumber, cedar poles, and to a less extent ponderosa pine lumber are in good demand, and draw prices sufficiently high to leave a margin for profit above stumpage, production costs, and transportation charges. The lower selling prices of other species restrict their sale to local markets and a limited out-of-state

FIGURE 10.—*Six and nine-tenths million acres of commercial timber, such as this, support the forest industry. The [illegible] d'Alene National Forest is typical of the western white pine forests in northern Idaho.* (*Photo courtesy 116th Photo Section, Washington National Guard.*)

distribution. Thus, from the western white pine type with the highest present worth the timber stands range downward in value to those of no present commercial-timber importance.

It seems likely that in the future the northern Idaho forest industry will continue to lean heavily on its western white pine stands (fig. 10). In view of this, it is noteworthy that only 2.4 million acres, or 23 percent of the total forest area, supports commercial western white pine stands, as shown in the following tabulation:

	Million acres
Commercial forest land:	
Stocked:	
Western white pine type	2.4
"Cedar" and cedar-grand fir types	2
Ponderosa pine type	1
Other types	2.0
Total stocked	6.0
Nonstocked (and status unknown [1])	1.0
Total	[illegible]

[1] 81,000 acres cut over since the date of survey, most of which very likely supports tree growth of some sort.

Northern Idaho's forest problem does not arise from a shortage of sawlog-size timber, but rather from a shortage of saw timber of marketable species. Although saw-timber stands occupy 2.6 million acres of the total 6.9 million acres of commercial forest land (fig. 11), only two-fifths of this area is in western white pine. Similarly, only three-tenths of the 1.8 million acres of pole stands—trees ranging from 5 inches to saw-timber size—is in western white pine, and of the 1.5 million acres of seedling and sapling stands, only half.

The million acres nonstocked or deforested, amounting to nearly 15 percent of the commercial forest land, calls for serious consideration, quite apart from the extensive acreage of noncommercial forest land deforested. Many of the acres recently deforested are restocking, but on the other hand a large commercial acreage is being [illegible] year. Moreover, a large area will remain deforested for some time to come. The 422,000 acres that [illegible] this status prior to 1925 has had ample time to restock, but has not done so. Available data do not show whether the deforested area is decreasing or increasing.

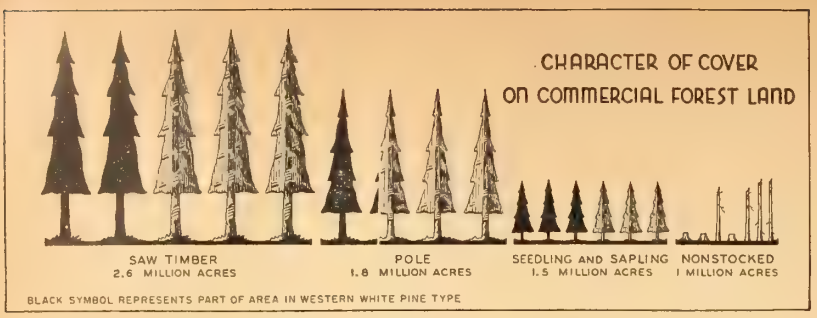


FIGURE 11.—*The character of cover on the 6.9 million acres of commercial forest land. A very important feature is the relatively small area in each productive class that is in the valuable western white pine type.*

The nonstocked area is only a partial measure of the lost productivity; in addition, 217,000 acres of pole stands and 250,000 acres of seedling and sapling stands are poorly stocked. In all, at least 1,370,000 acres of commercial forest land are either not producing at all or growing timber at only a fraction of their potential capacity.

Timber Volumes

The total volume of merchantable-size trees in saw-timber stands of northern Idaho is 38 billion board feet, Scribner log scale. This is almost 3 percent of the national total, and about the same volume as that of present saw-timber stands of the Lake States region. More than a fourth of the timber is western white pine, or approximately 10 billion board feet (fig. 12). Practically all of this—96 percent—is in the western white pine type. Cedar poles in saw-timber stands, which are equivalent to 1.1 billion board feet of the western redcedar total, number 6.3 million pieces.

Forest Survey volumes are generally somewhat higher than earlier estimates. This is chiefly on account of the less selective standards. These permit the inclusion of volumes in stands heretofore considered unmerchantable but having distinct possibilities for utilization sometime in the future.

Geographic Distribution

The various parts of northern Idaho were not originally clothed with forests of the same fabric. Moreover, cutting has not progressed at the same pace throughout the area. Thus, in digging beneath the over-all figures, one finds marked differences between the several localities in the percent of forest land that is commercial, in the proportion of virgin saw-timber stands remaining—particularly western white pine and ponderosa pine, and in the degree of present industrial activity. The forest lands can be divided along county lines into five economic districts on the basis of such differences (fig. 1). These are (1) the Sandpoint district, including Bonner and Boundary Counties; (2) the Coeur d'Alene-St. Joe district, including Benewah, Kootenai, and Shoshone Counties; (3) the Clearwater district, including Clearwater and Latah Counties; (4) the Winchester district, including Lewis and Nez Perce Counties; and (5) the Idaho County district, including the portion of Idaho County in northern Idaho.

It is noteworthy that the so-called noncommercial area in northern Idaho is not evenly divided among the districts. Two-thirds of the forest in the Idaho County district is noncommercial, whereas only 1 forest acre in 20 is so classified in the Winchester district (table 2).

Timber cutting has been heaviest in the Sandpoint and Coeur d'Alene-St. Joe districts, where saw-timber stands occupy only 27 percent of the commercial forest area. Years ago they were noted for an abundance of virgin timber. On the other extreme, the timber in the Idaho County district has hardly been touched. Here 55 percent of the commercial forest area bears saw-timber stands.

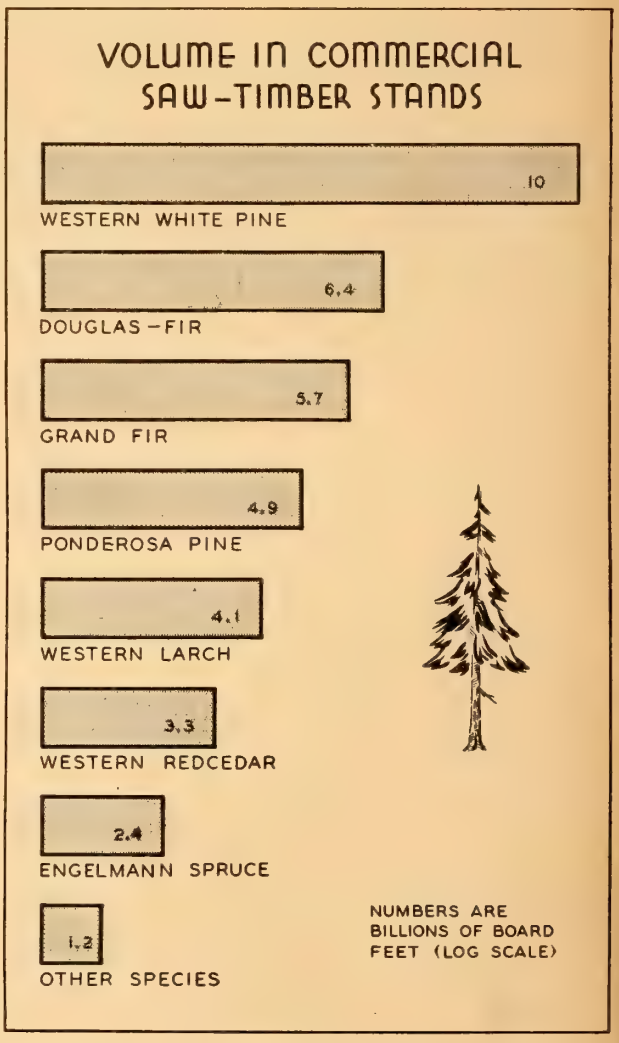


FIGURE 12.—*One-quarter of the saw timber is western white pine. The volume of western redcedar includes merchantable-size poles.*

It should be remembered that under present economic conditions the outlook is not so influenced by the total quantity of saw timber as by the volume of western white pine saw timber (fig. 13). Of course, this western white pine dominance may be changed at any time by future events, but at the present time this species occupies the center of the stage. In figure 13 it is shown that 55 percent of the remaining western white pine saw timber is located in the Clearwater district, and practically none in the Winchester and Idaho County districts.

TABLE 2.—*Area of all forest land, commercial forest, and remaining saw-timber stands in commercial area by districts.*

District	Total forest area	Commercial forest area		Saw-timber stands remaining in commercial area	
	1,000 acres	*1,000 acres*	*Percent*	*1,000 acres*	*Percent*
Sandpoint	1,799.0	1,491.6	83	403.5	27
Coeur d'Alene-St. Joe	2,714.9	2,429.1	89	650.8	27
Clearwarer	1,915.4	1,541.7	80	793.6	51
Winchester	191.7	181.6	95	85.7	47
Idaho County	3,708.8	1,223.4	33	672.2	55
All districts	10,329.8	6,867.4	66	2,605.8	38

Other Values

In classifying forest land purely on the basis of timber-production, there is danger of overlooking other important forest functions of very considerable if nonassessable value.

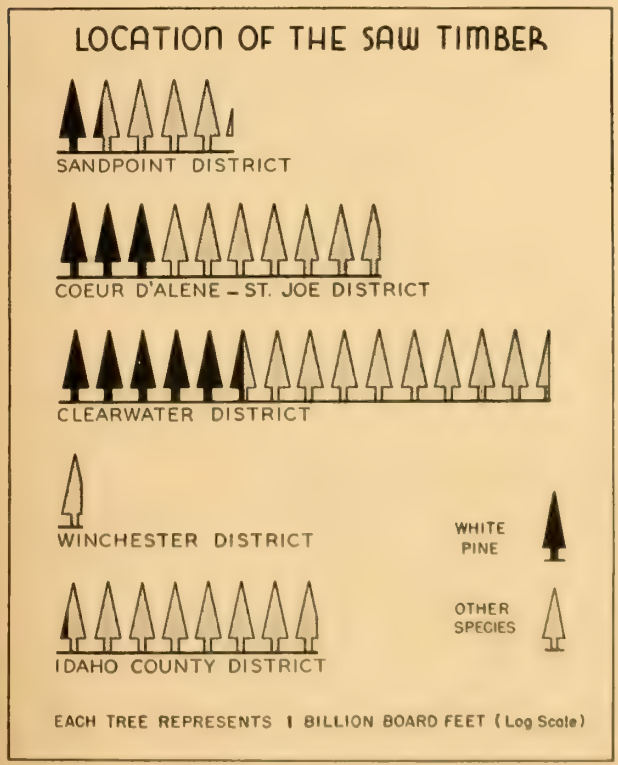


FIGURE 13.—*Most important is the concentration of 55 percent of the western white pine in the Clearwater district.*

FIGURE 14.—*Approximately one-third of the northern Idaho forest area ... noncommercial in terms of timber products.*

This is true, for example, of watershed protection, which cannot be evaluated realistically on a dollars-and-cents basis and yet may conserve values outweighing commercial timber returns. Watershed values certainly lend a comparatively high worth to the 3.4 million acres of forest land having no present or potential value for timber production (fig. 14).

Water is a most important resource in the great Columbia Basin area, where the Columbia River and its tributaries are of primary importance to local agriculture and industry. The principal possibilities for successful agricultural expansion in this great basin are on the ... acres which it seems feasible to irrigate in Idaho, Washington, and Oregon. The wartime and after ... industrial expansion likewise will largely ... great amount of power to be developed by the ... Coulee and Bonneville Dams. Near ...

FIGURE 15.—*Scenery is an ever more valuable asset of the northern Idaho forests. Recreationists are a free-flowing source of income, and from gas-station attendant to hunting guide, members of the local communities share the earnings of scenic lakes and forests. Approximately one third of the 10 million acres of forest land in northern Idaho is chiefly valuable for watershed protection and recreation.*

water reaching the Grand Coulee dam site and an eighth of the flow passing over the Bonneville Dam originate in northern Idaho.

The forests of northern Idaho fit into this picture as part of the extensive stand protecting the mountain headwaters of this drainage basin. In this country of steep slopes, this protection is most important in reducing the number and severity of floods, in more evenly distributing run-off over the year, and in reducing soil wastage.

Although subordinate to watershed protection and logging, recreation is likewise of major importance (fig. 15). One and one-half million acres of forest land in the national forests and a smaller area of State park lands have been set aside for recreational use and classified as noncommercial, including 236,000 acres having an actual commercial value. Many other areas not formally reserved also have a high value for recreation, and nearly all of the 3.4 million noncommercial acres has some recreation value.

While the communities and industries of northern Idaho were becoming established, only small use was made of the recreational opportunities afforded by the forests. Inadequate transportation facilities limited forest recreation of the residents of nearby communities, many of whom were too busy to absorb the fullest enjoyment from their surroundings. As automobiles became more common, the forest users increased in number somewhat, but inadequate highway development in Montana and Idaho discouraged any general influx of tourists from other parts of the country for some years.

The late 1920's marked an advance in improved main highways and in the extension of logging and forest-protection roads into heretofore undeveloped areas of Montana and Idaho. These improvements resulted in an astonishing increase in the number of vacationists. Recreationists are a free-flowing source of income, and local residents, from gas-station attendant to hunting guide, have shared the earnings from scenic lakes and forests. A few towns have gained a new lease on life. Although no figures are available on the present recreation industry in northern Idaho, what it has meant to the State is indicated by the following Forest Service estimate of visitors to the national forests who hunted, fished, or used recreational facilities:

	Visitors
1925	36,000
1930	40,000
1938	168,000

In addition, many persons—estimated in 1938 at 3.4 million—pass through the national forests. Of these the greater number are tourists, to whom the scenic beauties of the forests are of definite recreational value.

The recreational use of the forests, wildlife, and waters in northern Idaho has covered the full range of summer and winter outdoor pastimes from skiing and picnicking to hunting and pack trips. Private participation in developing the recreational resources has been principally along the shores of the three large lakes, Priest, Pend Oreille, and Coeur d'Alene. In Heyburn State Park and the national forests, the State and Federal Governments have provided the improvements necessary for camping and other types of recreation. To preserve a portion of the wilderness in its original state, 1.5 million acres of back country in the national forests of Idaho County have been reserved from development. This reservation is known as the Selway-Bitterroot Wilderness Area (fig.14). Roadside timber strips have also been set aside in the national forest to help maintain the scenic assets of northern Idaho.

Grazing is another important forest use. The majority of the farmers in the forested area rely to some degree upon livestock for income. According to the 1938 real estate classification by the tax assessors, 1.4 million acres, or 47 percent of the privately owned land not classed as saw timber or agricultural, was grazing land. In addition to the revenue from local livestock, a substantial income is received annually by public and private agencies from grazing fees paid by out-of-state sheep owners. A record for 1938 shows that 95,000 sheep and 83,000 lambs from ranches in Washington and Oregon were summered in northern Idaho.

Forest-Resource Ownership[5]

THE success of forest planning is limited by the ability and desire of landowners to participate. The private owner is concerned with the immediate and practical problem of making an income on his investment, which, in northern Idaho, has not been particularly easy during recent years. Most private forest owners have been forced into a relatively short-time viewpoint in the management of their lands.

The primary public interest extends beyond the next few years—or even the next two or three decades—and the social gains and losses of forest communities must be balanced over a longer period. Today the immediate interests of the private forest-land owner and the long-time interest of the public are in direct conflict, with the public facing a distinct economic loss. One of the primary objectives of forest planning is to help the present private owner go farther in satisfying the public interest than he has been financially able to do in the past. To the extent that this is not possible, an effort must be made to transfer the title of forest land to a form of ownership which can assume this responsibility.

The ownership pattern in northern Idaho does not lend itself readily to effective timber management. By the very nature of the crop, requiring a century or more to mature, forest units, if they are to be managed efficiently on a commercial scale, should occur in large unbroken blocks. Yet, its patchwork nature is one of the outstanding features of the present ownership pattern. This arises partly from the subdivision of the land into many small holdings, but partly from the fact that even the large timber holdings are generally not solid blocks. Unity of management is desirable and can be achieved either through cooperation of the many owners or through the amalgamation of the units into fewer holdings.

[5] The bulk of the land-ownership information was collected from county records in 1934. Since that time an appreciable area has passed from private hands to the counties. Although it has been necessary to adjust area and volume-inventory estimates to allow for the cutting, fire losses, and growth between type mapping and January 1939, it has been impracticable to make any changes in ownership status.

History of Ownership

The local problems of forest-land ownership may be said to have had their origin in the Federal land policy in disposal of the public domain, which was geared to meet the needs of an agricultural industry in farm regions where 160 acres of farm land would adequately sustain a family. In retrospect, the unwisdom of carrying this policy into the forested mountains of the West is obvious.

In the middle of the nineteenth century, the entire area of northern Idaho—12.5 million acres—was unappropriated public domain. The creation of the Lapwai Indian Reservation by the Stevens Treaty of 1855 marked the first large elimination of land from this public domain, and marked also the beginning of 50 years of extensive alienation. In 1863 the organic Act of the Idaho Territory provided for the reservation of sections 16 and 36 in every township to furnish revenue for the use of public schools and established the nucleus of the State holdings. The fertile prairies began to attract homesteaders in large numbers during the 1870's, and a wave of settlement followed which extended into the outer fringes of the timbered country. Settlement was stimulated by the construction of the Northern Pacific Railroad in the early eighties. By the terms of acts of 1864 and 1870, this company had acquired the largest single private-land holding in northern Idaho, a checkerboard allotment of unoccupied odd-numbered sections for 40 miles on both sides of its track, and the privilege of making lieu selections for the occupied sections in two additional 10-mile strips. According to a record compiled in 1924, the railroad received 1.2 million acres of land under the terms of this grant.

Although large forest areas were thus earmarked, these early grants were made sight unseen on a purely arbitrary basis, with no conscious effort to select forest land. Nor did the first settlers seek forest lands to any extent. This situation changed only with the beginning of the present century, when lumbermen from the Lake States turned to the western white pine for the continuation of their

operations and sought to acquire working holdings. In one of the most interesting periods in the history of northern Idaho, large areas of forest land changed hands as timber took on speculative values. Between 1895 and 1907 or 1908, the bulk of the forest land now privately owned was patented from the public domain. Except for the Northern Pacific grant most of this forest land was acquired under the Timber and Stone and the Homestead Acts. A considerable part of the area, including a portion of the Northern Pacific lands, was subsequently sold to the large timber companies. During this period the State of Idaho sold the timber rights on a large area to these companies.

About the same time, the first move was made to withhold northern Idaho lands from private acquisition. The Bitterroot and Priest River Forest Reserves, forerunners of the present national forests, were created in 1897. The former, though covering a gross area of several million acres, had no great commercial significance inasmuch as the territory involved was largely mountainous back country which had been ravaged by many fires. The Priest River Forest Reserve contained more valuable timber. Growing public alarm over the rapidly shrinking public heritage resulted in the withdrawal of additional national-forest area between 1906 and 1908 (fig. 16). Since then the changes in national-forest acreage have been minor.

These withdrawals left very little unappropriated public domain and brought the period of large-scale private acquisition to a forced halt. Of the 10-million-or-so acres of forest land in northern Idaho, approximately 6 million were retained by the Federal Government as national forests. As these lands were withdrawn after the other agencies and individuals had enjoyed the privilege of first choice, the national forests do not contain a proportionate share of the commercial timber values.

Figures published by the Bureau of Corporations of the Department of Commerce [6] for the year 1909 show how successful the eastern lumbermen and speculators were in acquiring large holdings. According to this report, 10 concerns owned the timber on 1.1 million acres of forest land, nearly all of it merchantable stands. This area included some of the finest forest land in northern Idaho.

[6] United States Bureau of Corporations. The Lumber Industry. Pts. II and III, 236 pp., illus. 1914.

Figure 16.—*The holdings of private owners are scattered throughout the national forests. However, six-tenths of the total forest area is national forest land.*

In addition, there were several other large private owners of land.

The forest picture in 1910 was more or less like this: The Federal Government still retained the bulk of the forest area, but the commercial foreground was dominated by the large timber operators who held the best of the western white pine and ponderosa pine and controlled still more in the smaller holdings encompassed by their extensive domains. Apparently the first all-inclusive record of timber volumes and ownership in northern Idaho was prepared about 1915. These data, adjusted somewhat, are shown below. They are unrealistic from an economic

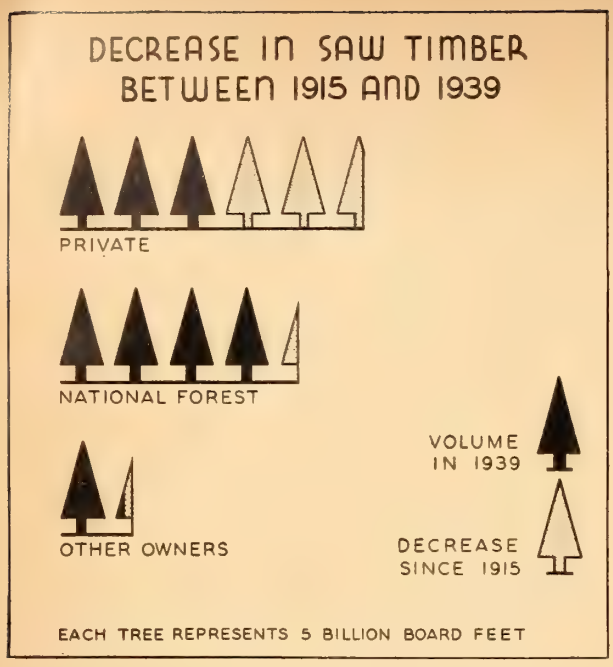


FIGURE 17.—*The heavy drain on private saw timber makes the national-forest timber increasingly important. Noncommercial stands, of which the greater part are on national forests, are included.*

standpoint in that all of the noncommercial saw timber, which is mainly in the national forests, is included.

	Billion board feet (log scale)
Private	28
National forest	22
Other public lands	7
Total	57

Three decades of heavy cutting have brought about a gradual change in the relative positions and importance of private and national-forest timber. Cutting during that period has been concentrated principally on private lands. The estimated average annual cutting drain for the period 1935–38 is 49 million board feet from the national forests and 575 million board feet from all other lands; this is fairly indicative of the proportion of cut coming from national forests and other lands during the past 30 years.

As a result of this drain the private timber supply has shrunk from 28 billion board feet in 1915 to 15 billion board feet in 1939, and national forest timber has declined from 22 to 20 billion board feet during the same period (fig. 17). To make the comparison with 1915 valid, the noncommercial stands were included for 1939. Inasmuch as the national forests hold the greater part of the noncommercial timber, figure 17 in no way indicates the present relative commercial importance of the several ownerships.

Following removal of the timber, forest land ceases for the most part to be an attractive private investment. Consequently, cut-over and burned-over areas are drifting back into public ownership, Federal and county. Up to 1938 a total of 330,000 acres had been acquired by the national forests, largely through donation from the large private owners and counties and partly through the exchange of national-forest timber for land. Most of this increase took place after 1928.

Less desirable is the increasing county domain as the result of tax delinquency and foreclosure. At present the county is no better able than the average private owner of cut-over forest lands to manage growing stands properly. Until this situation is corrected, county ownership is naturally no solution to the problem. In the 10-year interval between 1928 and 1938, the rural area on the tax rolls decreased by 518,000 acres donated to the national forests by private owners or reverted to the counties. Some of the latter ended up in the national forests. Since in 1928 only 4.9 of the 12.5 million acres in northern Idaho was subject to taxation, the loss of one-half million acres from the tax rolls is significant. It seems inevitable that, as time goes on, more lands will be dropped from the tax rolls for one reason or another. Counterbalancing the rapid rise of private ownership during the latter part of the ninteenth century and the early part of this century, the downward trend has definitely set in and, although more gradual, it will probably continue for many years. The threat to the solvency of of the forest counties is apparent.

Present Forest Ownership

From even the very rough estimates of the forest resource available heretofore, it has long been apparent that the holdings of the several classes of owners differ significantly with respect to commercial values. The refinements in classification possible through the forest-survey data make these differences even more striking. In the preceding section, the wide range of forest-land values was emphasized. Beginning on the lower end of the scale with the vast area of noncommercial forest, public ownership predominates. Proceeding upward toward the stands with greatest value, the public holdings become less important and the proportion of private holdings increases.

Total Forest Area

The public is the biggest forest owner in northern Idaho. Approximately 7.4 million of the 10.3 million acres of forest land is owned or managed by the Federal, State, and local public agencies. Of this, 6.3 million acres is in national forests. The following tabulation shows the proportion of total forest area in each ownership, the small private class including, for the most part, owner-

ships of 1,000 acres or less of forest land, and large private, those of more than 1,000 acres:

	Percent
Large private	13
Small private	15
Total private	28
National forest	61
State	7
Other public	4
Total public	72
Grand total	100

Commercial Forest Area

As shown below, the national forests comprise a larger share of the 6.9 million acres of commercial forest land than is held by any other class of owner. It is significant, in this region where large concerns produce most of the lumber, that only 17 percent of the commercial forest area is classified as large private:

	Percent
Large private	17
Small private	22
Total private	39
National forest	47
State	9
Other public	5
Total public	61
Grand total	100

Commercial Saw-Timber Area

National forests include 45 percent of the commercial saw-timber area, which is little different from the corresponding percentage for all commercial forest acreage given above. It will be noted, however, in the following tabulation, that the relative importance of the small private and other public owners has declined and that the proportionate representation of the large private and State owners has increased:

	Percent
Large private	24
Small private	14
Total private	38
National forest	45
State	13
Other public	4
Total public	62
Grand total	100

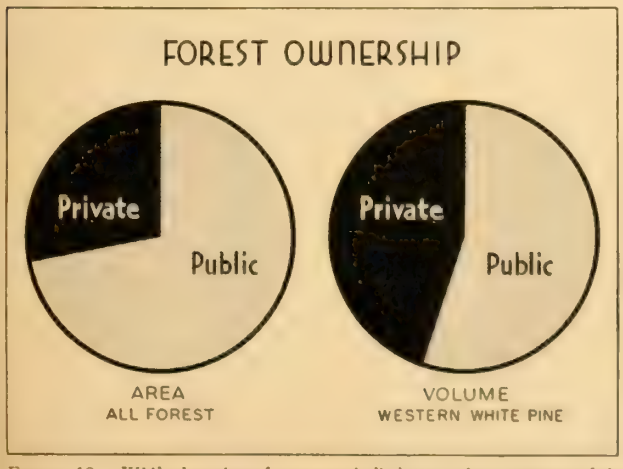


FIGURE 18.—*While the private forest area is little more than a quarter of the whole, it contains nearly half of the most valuable timber.*

The factor of quality is apparent again when densities of commercial saw-timber stands are compared. The average acre of large private saw timber bears 18 M board feet as compared with 14 M feet in national-forest saw-timber stands. Differences in value due to species composition are equally great. For example, more than half (55 percent) of the large private commercial saw-timber area is western white pine type, whereas 38 percent of the national-forest saw-timber area is of this type. Only 11 percent of the small private saw-timber area is western white pine type.

Western White Pine Saw-Timber Volume

Who owns the western white pine saw timber? This is the ownership question of greatest interest to the present-day lumber industry. Even though the national forests include 61 percent of the total forest area, they contain only 36 percent of this western white pine volume. However, as the State owns 1.8 billion board feet, 55 percent of the commercial western white pine is publicly owned. A total of 41 percent is owned by those concerns and individuals collectively grouped as large private (fig. 18). The present commercial importance of the small private holdings is indeed small, as they account for but 4 percent of the western white pine volume. The proportion of western white pine held by each ownership class is as follows:

	Percent
Large private	41
Small private	4
Total private	45
National forest	36
State	18
Other public	1
Total public	55
Grand total	100

It is significant that the State and the large private owners which hold only two-tenths of all forest area own six-tenths of the western white pine volume.

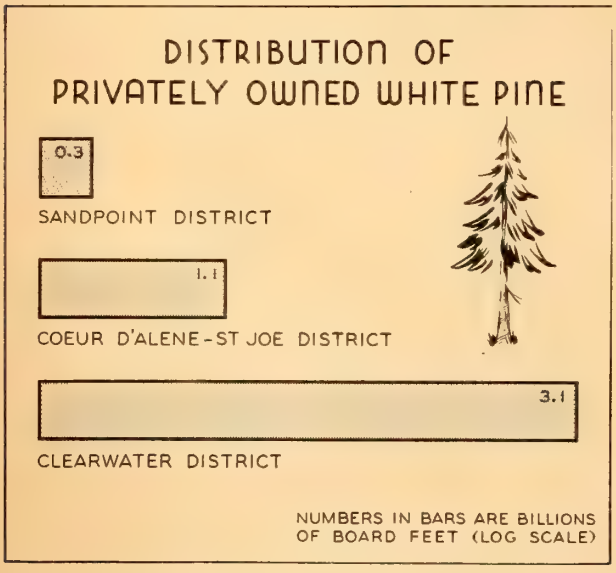
Local Variations in Ownership

The discussion of forest ownership is incomplete without considering the wide variations between localities. For this purpose the five districts previously defined will be used. To avoid confusion the comparison of local ownership will be restricted to the two most important forest classifications; namely, commercial forest land and commercial western white pine volume. The proportion of all commercial forest held by the several classes of owners is shown in table 3 for each of the five districts.

TABLE 3.—*Percent of commercial forest land in different ownership classes and districts*

Ownership class	Sandpoint	Coeur d'Alene-St. Joe	Clearwater	Winchester	Idaho County
National forest	44	48	32	--	72
Large private	18	17	28	16	4
Small private	22	23	21	68	14
State	12	5	17	3	4
Other public	4	7	2	13	6
Total	100	100	100	100	100

At one extreme is the Idaho County district with 82 percent of its commercial area publicly owned, and at the other is the Winchester district with 17 percent belonging to the public. In the Sandpoint, Coeur d'Alene-St. Joe, and Clearwater districts, where forest industry has been characterized by large concerns, only 20 percent of the commercial area is in large private ownership. In the period of acquisition, these owners acquired a large part of the valuable saw timber without having to purchase a corresponding proportion of the forest-land area. Practically all of the western white pine timber volume is located in these three northern districts.



Figures 19. The last extensive acreage of western white pine is in the Clearwater district, of which 56 percent is privately owned.

It was shown that private operators, large and small combined, hold 45 percent of the commercial western white pine saw-timber volume in northern Idaho as a whole. In the Sandpoint district, however, private holdings account for only 24 percent of the remaining western white pine (fig. 19). This low percentage is, of course, due to the past heavy cutting of private timber. The national forests contain 43 percent of the western white pine in the Sandpoint district. The State holdings are almost as important, as they include 33 percent, making a total of 76 percent for the State and national forests.

In the Coeur d'Alene-St. Joe district, extensive logging in private timber has resulted in a more or less similar pattern, with 62 percent of the commercial western white pine in the State and national forests as compared with 36 percent privately owned.

An entirely different situation exists in the Clearwater district where 56 percent of the western white pine is in private hands, 22 percent the property of the State of Idaho, and only 21 percent in the national forests. However, with logging principally concentrated on private lands, as it is today, the privately owned timber is bound to be depleted rapidly.

Table 4 should be studied with care, as the volume of western white pine, its location, and ownership are primary factors in the future of the lumber industry and the communities in northern Idaho.

TABLE 4.—*Ownership and location of commercial western white pine saw-timber volume, in million board feet, log scale*

Ownership class	Sandpoint	Coeur d'Alene-St. Joe	Clearwater	Winchester	Idaho County	Total
National forest	534.9	1,664.5	1,145.0	--	222.4	3,566.8
Large private	288.9	982.6	2,811.5	0.1	10.9	4,094.0
Small private	13.2	97.6	250.0	--	1.0	361.8
State	410.4	188.4	1,221.4	--	1.2	1,821.4
Other public	5.8	58.3	48.0	--	7.3	119.4
Total	1,253.2	2,991.4	5,475.9	.1	242.8	9,963.4

The Ownership Pattern in Forest Management

The foregoing discussion leaves unanswered the logical question—how does the ownership picture in northern Idaho differ from the one which would be necessary for a stable forest industry? A complete answer to this involves the not-too-simple economic question of just who can profitably raise timber crops in this area. Discussion of this part of the question with its controversial angles must be postponed to the section on forest economic factors. For the present, only the physical factors of size and diversity of ownership will be considered. It must be admitted that in the past the size of private holdings, for the most part, has not made any particular difference in the manner of utilizing the timber. Even those operators more fitted for continuous production by virtue of their extensive

holdings have constructed mills with capacities for saw timber far exceeding what their forests and their neighbors' forests can supply for more than a limited period. This must be blamed partly upon the necessity of meeting heavy carrying charges, partly upon the difficulty of converting overmature forests into managed units, and partly upon the American philosophy of the time, "bigger and better everything."

Before discussing the problems arising from the present size and diversity of ownership, it is necessary to eliminate the farm-forest land. This does not mean that there is no farm-forest problem, but rather that the ownership pattern has contributed little to farm-woodland abuse. According to the 1935 census, there were 727,000 acres of forest land in farms. If it is assumed that none of this area is noncommercial, the commercial forest area can be broken down into two broad ownership classes, industrial and farm. This assumption involves no great possibility of error, as only 2 percent of the "small private" forest area is noncommercial. This break-down works out as follows:

	Thousand acres
Industrial:	
Small private	775
Large private	1,180
National forest	3,195
State	614
Other public	376
Total industrial	6,140
Farm	727
Grand total	6,867

From the above tabulation, it is apparent that the farm forest is a small factor in the general forest situation in northern Idaho, the 727,000 acres of forest land in farms being but 11 percent of the commercial forest area. This is in marked contrast to the eastern half of the United States, where farm forests are two-fifths of the total.

What then is a satisfactory unit of management for the 89 percent of the forest land designated as the "industrial area"? This forest land is a vast patchwork of old stands, young stands, and deforested areas. Owing to the nature of the market, no cash return can be obtained from most areas until the timber reaches sawlog size at an age of 80 to 140 years. Thus, if an operating unit is to continue on a permanent basis it must contain an assortment of stands to be found only in relatively large areas. Whether the operating unit be 2,000 acres or 200,000 acres depends upon the condition of the forests and the production desired. However, it is estimated that an operating unit of 100,000 to 200,000 acres would be required to produce continuously 10 million board feet of white pine a year. Although it is not necessary that a single owner hold title to all the timber in a management unit, the greater the number of owners, the greater the difficulty of obtaining united action.

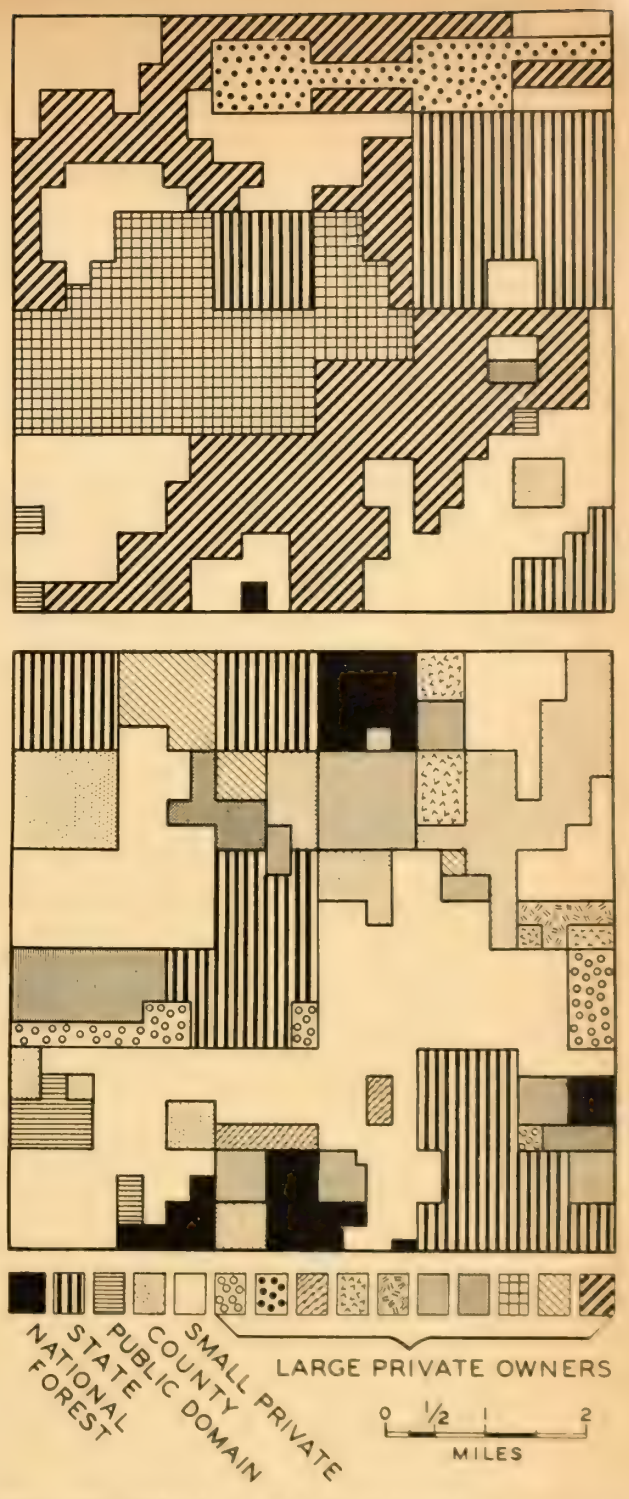


FIGURE 20.—[illegible] showing [illegible] National Forests. [illegible] holdings.

The subdivision of private holdings into two groups may give the impression that the "large private" and public holdings are in compact blocks. This is true to a certain extent, but figure 20 probably portrays a more [illegible]

situation. In this figure the holdings of even the large owners are shown to be broken up. It should be remembered that the "small private" area in these two townships is held by a great number of owners. No figures are available to indicate how large the individual tract in this "small private" group may be, but since 160 acres was the unit of acquisition under the Timber and Stone and Homestead Acts it is not likely that the average area is much larger than this now. Thus, the task of obtaining the necessary unity of action through cooperation, purchase, or any other means is immeasurably more complicated than the number of symbols on the maps would indicate.

Forest-Industry Development

PRIOR to 1900 the timber cut in northern Idaho was limited mainly to the quantity needed for local use—lumber and fuel wood for the homes, and lumber, ties, fence posts, timbers, and other products needed by the agricultural, mining, and railroad industries. These requirements were, as they still are, comparatively small, and consequently the aggregate cut was not large. It was not until outside markets were developed after 1900 that the forest industry came into its own.

Lumber Industry

A census of production for 1869 indicates that 1.8 million board feet of lumber was produced during that year. The annual output climbed during the next 30 years to 56 million board feet in 1899. From there it rose to 705 million board feet in 1910 and, from a minor place in the local economy, lumbering became a primary source of wealth.

The curve of production following 1910 presents a jagged line, rising and falling with the fortunes of the Nation, but continuing generally upward until 1925 when it went into reverse, reaching a depression low in 1932. The recovery since then has been only partial. These trends are shown in figure 21, which calls attention to several significant points.

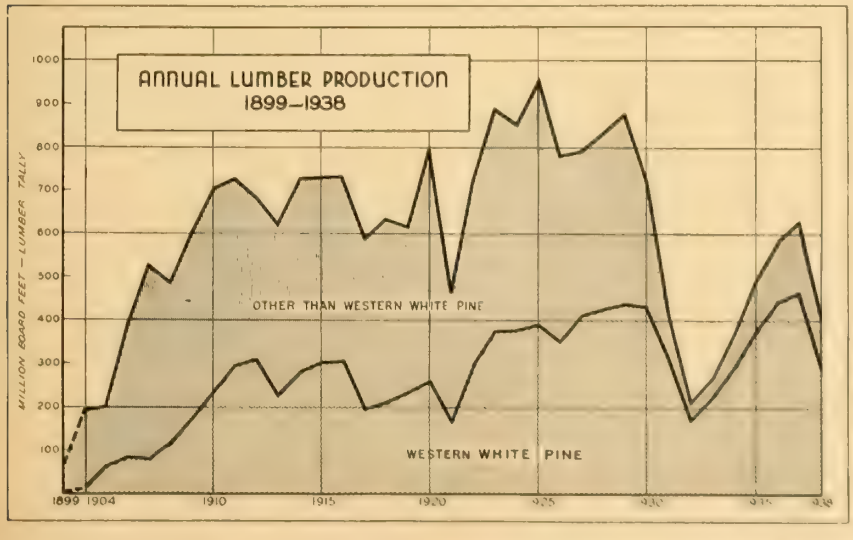


FIGURE 21.—*In 1925, 41 percent of the lumber cut in northern Idaho was western white pine. In 1938 the proportion had risen to 71 percent.*

In 1937, the best recent year up to 1940, the total lumber cut of all species in northern Idaho was 34 percent less than that in 1925, which was the all-time high. This compares interestingly with the decline in sawmill production for the Nation as a whole, which was 32 percent in the same 12-year interval. The cut of all species in northern Idaho except western white pine dropped from 565 million board feet in 1925 to 169 million feet in 1937, or 70 percent. But for western white pine alone, 1937 was the peak year, and in that year 18 percent more western white pine was sawed than in 1925.

The tailspin into which ponderosa pine production fell is particularly striking. Up to 1910 this was the principal species logged. In that year 255 million board feet was sawed. The next peak was 237 million board feet in 1925. The nearest approach to these figures up to 1940 was an 80-million cut in 1937.

The economy of the lumber communities, and thus indirectly the economy of northern Idaho as a whole, has been profoundly shaken by the decline of the industry. Seventeen sawmills with individual capacities of 5 million board feet or more and an aggregate capacity of one-half billion board feet, ceased operation between 1925 and 1939. Five others were built during the same period, but these did not replace the loss of the 17. Altogether in 1925, there were 33 sawmills of 5 million board feet capacity, having a total annual capacity of 1.1 billion board feet. The combined capacity of the 21 mills operating in 1939 (fig. 22) was 0.8 billion board feet. Much of the new capacity represents a migration from cut-over to virgin areas rather than a replacement in the localities suffering the losses.

The lumber industry picture in northern Idaho is simple in that it has been and is dominated by a few large mills. In 1938 the Census Bureau reported 90 sawmills operating in this area, producing 406 million board feet of sawed material or 4.5 million board feet per mill—more than three times the national average. However, and this point

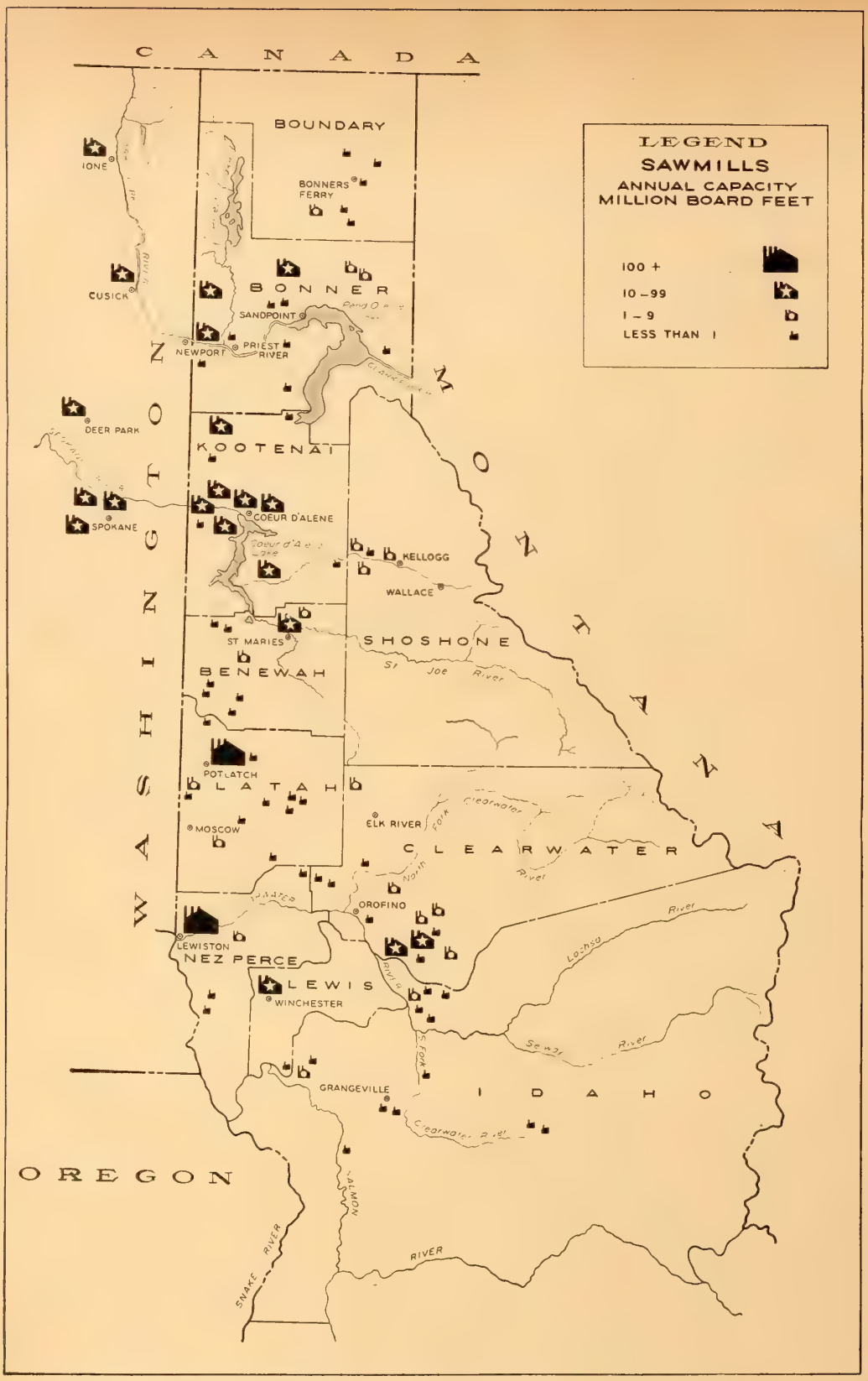


FIGURE 22.—*Distribution of sawmills in northern Idaho, including six large mills in northeastern Washington, 1939.*

FIGURE 23.—*Comparison of annual timber production of the three principal industrial-economic districts in percent of the peak production for each district. The peak year for Coeur d'Alene-St. Joe and for Sandpoint was 1925; for Clearwater-Winchester it was 1929.*

is particularly worthy of attention, 15 of these plants, shown in figure 18 as having capacities of 10 million board feet or more, produced 84 percent of the lumber in that year.

It is interesting to note that the largest of these mills, with an annual capacity of something over 200 million board feet—sufficient to have cut one-half of the total lumber production in northern Idaho during 1938—had not up to 1940 produced lumber to its full capacity. This points to another aspect of the general decline. In the decade 1929–39, the operations of those mills still running slowed to the point where even in 1937 the differences between actual production and potential capacity were markedly greater than formerly. For example, 10 selected mills, which in the 5-year period ending with 1925 had produced at 67 percent of their capacity, during the 5 years 1934–38 produced at only 44 percent of their maximum, and in 1937, the operating ratio was 57 percent.

FIGURE 24.—*The Clearwater Plant of Potlatch Forests, Inc., at Lewiston, Idaho. Located in a farming area, the w... quarters, which is the center of this company's logging operations. It was built in 1927 and is the largest ...*

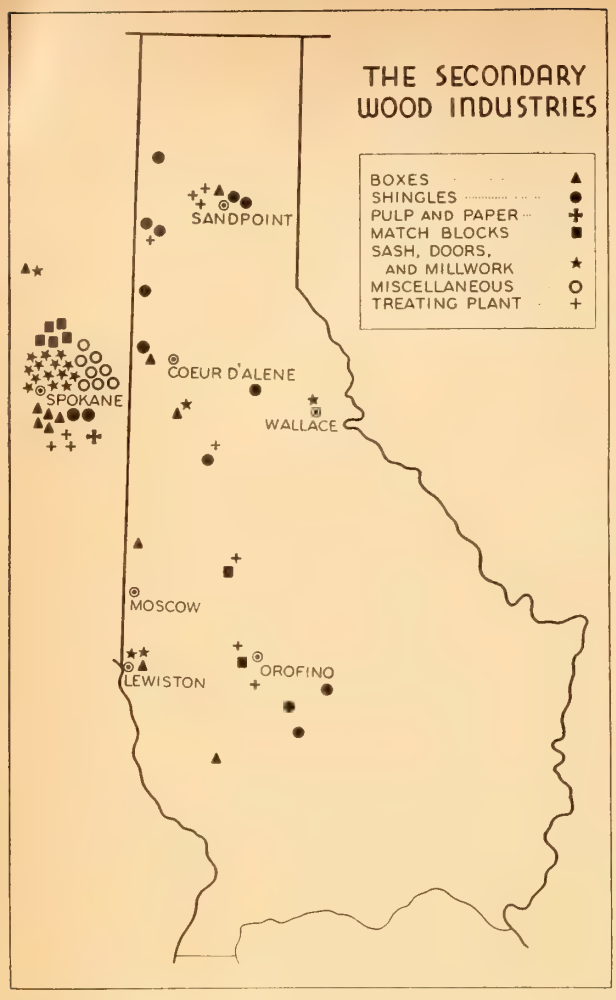


FIGURE 25.—*Spokane, Wash., is the center of the remanufacturing industries of this region and has drawn heavily on the forests of northern Idaho for raw material.*

Lumber Industry by Districts

The racking effect of the lumber decline has not been evenly distributed among the timber-producing centers of northern Idaho. This can best be shown in a comparison by industrial-economic districts as in table 5 and figure 23. These are the districts shown in figure 1, except that Clearwater and Winchester are combined, since the large mill at Lewiston in the midst of a farming district obtains its logs from the forests of the Clearwater district.

In the Sandpoint district (Bonner and Boundary Counties), the first large lumber mill was constructed in 1900, and by 1911 the industry reached a peak of 10 medium- to large-size plants. The maximum lumber cut in 1925 was in a sense an anticlimax, since four of these sawmills had already been abandoned. Since then, the decline has been sharp. In 1939 four mills of 5 million or more board feet capacity were operating, but three of these were constructed since 1926. Their total annual capacity is 65 million board feet compared with an aggregate capacity of 290 million board feet in more palmy days. Lumber production in the Sandpoint district during recent years (table 6) is actually less than the timber cut from the forest, since a sizable volume of logs is now shipped from this district to mills in eastern Washington and Coeur d'Alene.

In the Coeur d'Alene–St. Joe district (Kootenai, Benewah, and Shoshone Counties), several large sawmills were operating before 1900 to supply the Coeur d'Alene mine field. The general influx of eastern lumbermen began about the same time as in the Sandpoint district, but the expansion continued longer and reached greater heights. Although a few of the earlier mills ceased operating from time to time, the loss of these was offset by the construction of new and larger ones. The expansion culminated in 1925 when 17 medium to large mills sawed 469 million board feet of lumber. The decline after 1925 was steady but somewhat less severe than it was for the Sandpoint district. By 1936 and 1937, a recovery had reached 50 percent of the 1925 maximum. In 1938, 11 mills were still operating and the total cut of the district was about one-third of the maximum. Since 1938 the large mill at Spirit Lake has ceased operating, leaving a stranded community. A waning supply of timber within the district has forced the remaining mills to reach far out for their logs, and the abandonment of other sawmills in the Coeur d'Alene district is in prospect.

In the Clearwater-Winchester districts (Latah, Clearwater, Lewis, and Nez Perce Counties), the first of the larger sawmills began operating at Potlatch in 1906, but not until 1927 was the industry completely expanded. During this year the Lewiston sawmill (fig. 24), the largest in the region, was constructed to handle the vast reservoir

TABLE 5.—*Lumber production in northern Idaho by districts, in million board feet, lumber tally, 1925–38*

Year	Sandpoint	Coeur d'Alene-St. Joe	Clearwater-Winchester[1]	Idaho County
1925	236	469	247	3
1926	209	390	177	2
1927	175	377	236	1
1928	156	347	325	2
1929	137	329	408	2
1930	96	281	344	1
1931	71	180	164	2
1932	11	104	93	2
1933	29	144	92	2
1934	26	149	189	2
1935	28	181	280	3
1936	52	235	293	3
1937	59	233	331	6
1938	46	150	207	3

[1] Combined, since the large mill at Lewiston draws heavily on the forests of the Clearwater district.

of western pine timber south of the North Fork of the Clearwater River, which up to that time had been barely broached. The largest timber cut in this district (up to 1940) was 408 million board feet in 1929. The 1938 mill production was 207 million board feet. The mills in this locality now have a greater capacity and also produce more lumber than those of the Coeur d'Alene-St. Joe district.

Little significance can be attached to the timber-production figures for the Idaho County district, because of the present lack of sawmill development in this area. Although 21 percent of the commercial saw timber is located in this county, only 2 percent of the western white pine resource lies within its boundaries.

Another group of lumber plants has figured prominently in the history of northern Idaho. These are the mills in the city of Spokane and in Pend Oreille County, Wash., which have relied upon the forests of Idaho for a large part of their raw material and in 1938 sawed 73 million board feet of Idaho logs (fig. 25). Also, a small volume of logs is shipped annually into Montana for manufacture. Offsetting these exports to a certain extent are the log shipments into Idaho from Washington and Montana. The balance in million board feet (lumber tally) is in favor of northern Idaho by the considerable margins of exports over imports shown in the following tabulation:

FIGURE 26.- *Logs in the Priest River during the summer [illegible]*

	Million feet
1934	[illegible]
1935	[illegible]
1936	[illegible]
1937	[illegible]
1938	[illegible]

Cedar Products Industries

Even before the lumber industry began to expand, the cedar-shingle industry of northern Idaho was marketing some of its product in other States. Records of early years show that there were a number of shingle mills scattered through the area north of the St. Joe River. In 1899 approximately 16 million shingles were cut in northern Idaho. Data are lacking for some of the following years, but the available statistics indicate that production rose steadily to 1907, when the output totaled 64 million pieces. The high demand for the Idaho cedar shingle began to lessen following 1917, and thereafter production coasted generally downward for several years. During the 1925–34 decade the average annual shingle production was approximately 11 million pieces, or about one-sixth of the 1907 figure. During the 4-year period 1935–38, there was a marked revival in the shingle industry.

Cedar pole and pile production has also been an activity of major importance in northern Idaho and has been carried on more or less in conjunction with lumber operations. The forests of this area have been one of the principal centers producing the large number of poles used by the power and communication systems of the Nation. In the period 1925–29, the commercial output of poles in northern Idaho was almost one-tenth of the total number of poles produced in the United States.

In contrast to the detailed statistics [illegible]

most no record was kept of pole production prior to 1925, and data are available only for the alternate years since then. The following tabulation presents the commercial pole and pile output for these years in northern Idaho:

	Number
1925	218, 000
1927	291, 000
1929	447. 000
1931	228, 000
1933	9, 000
1935	169, 000
1937	382, 000
1939	271, 000

The earliest cedar pole operations were principally centered in the vicinity of Sandpoint and St. Maries, and until the last decade these two localities had produced the bulk of the poles coming from northern Idaho. With the opening of the Clearwater country, the industry shifted southward.

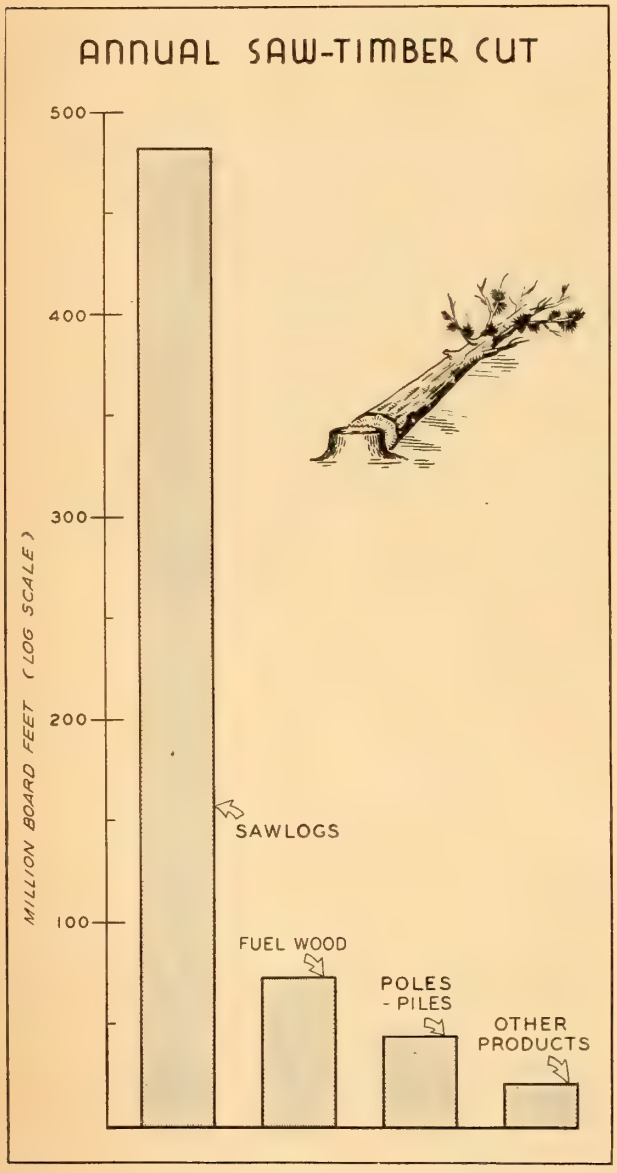


FIGURE 27.—*Seventy-seven percent of the green saw timber felled is sawed into lumber.*

On the map in figure 25 are located the shingle mills, pole yards, and remanufacturing industries of northern Idaho and Spokane, Wash. Also shown is the pulp and paper mill at Spokane. Pulpwood is shipped to this mill from northern Idaho, which has no pulp plant of its own.

Cutting Drain

In addition to the sizable net volume of logs shipped out of northern Idaho each year for manufacture into lumber is the volume of logs transported by flatcar, stream, and truck (fig. 26) from one to another of the districts. Obviously the volume of timber felled in any area is the basic consideration in the management of its resources, rather than output of its sawmills. This distinction is unimportant for most of the timber products other than lumber, shingles, and paper pulp, as the process of manufacture is completed near the stump.

In making the transition from sawmill production to timber cut, the reader if he is to avoid confusion must perform a mental hopscotch. The preceding board-foot lumber figures represent mill output in lumber tally—an actual tally of the boards, plank, timbers, and railroad ties produced. The following board-foot figures of cut are a measure of the trees felled to produce the various commodities—called log scale. Lumber-tally or mill-run figures generally overrun the log scale estimates by varied amounts. The average overrun for 1938 is estimated to have been around 21 percent.

Eight timber products in addition to sawlogs for lumber are cut in significant amounts from the forests of northern Idaho. Their output has fluctuated from year to year depending upon a number of factors. For that reason the average annual cut of any particular period, although a "yardstick" measuring past performance, is not necessarily an indicator of what is likely to happen in the future. The following "yardstick" figures have been rounded off from such past cutting records and estimates as were available (lumber 1935–38, other products approximately 1925–34):

	Average annual production
Sawlogs (for lumber)	482.6 million board feet log scale.
Fuel wood	371 thousand cords.
Cedar poles and piles	245 thousand pieces.
Other piles	64 thousand linear feet.
Hewed ties	16 thousand pieces.
Shingle logs	1.5 million board feet log scale.
Pulp logs	20 thousand cords.
Round mine timbers	2 million linear feet.
Fence posts	2 million pieces.

FIGURE 28.—*Because of market factors the lumber industry has been forced to concentrate upon white pine of which there is 10 billion board feet remaining in stands such as this and younger. This heavy stand of white pine is probably more than 300 years old.*

As they stand, these figures do not directly compare with the inventory estimates which have been developed through the text so far. They represent the total cut from green trees and dead trees, from saw-timber trees and smaller trees. Of the 371,000 cords of fuel wood, approximately 153,000 cords has been cut from dead timber and 20,000 cords from slabs. Also, 800,000 out of the 2 million fence posts are estimated to have come from dead timber. This dead-cut material represents a salvage of trees killed by fire and other causes. The other products are largely green-cut; however, of the green-cut products, a small portion of the hewed ties, fuel wood, fence posts, and mine timbers is derived from trees of less than saw timber size.

Since the scope of this report must be limited to the major aspects of the forest situation, only the cutting drain from live saw-timber-size trees will be analyzed here (fig. 27). The total cutting drain in cubic feet is shown in the appendix.

In discussing the value range of the forest resource, the importance of species composition has been emphasized. With this in mind, the cutting drain by species, as shown in table 6, is particularly significant. Of the saw timber on all commercial forest land 25 percent is western white pine, whereas 56 percent of the cut of all saw-timber products is western white pine. As has been mentioned before and will be repeated, this lopsided concentration upon western white pine is one of the major elements of the forest problem (fig. 28).

The lumber industry is slowly strangling, because of the necessity of limiting its cut to such a small proportion of the resource. This situation has become more serious in the last 15 years. Which way the scales swing in the future will depend on economic developments. Some of the items having influence upon the trends will be discussed in the chapter on economic factors.

TABLE 6.—*Average annual cutting drain from green saw timber by species 1935–38* [1]

Species	Logs for lumber	Other products	Total
	M board feet	*M board feet*	*M board feet*
Western white pine	350,700		350,700
Ponderosa pine	69,500	26,700	96,200
Other species	62,400	115,100	177,500
Total	482,600	141,800	624,400

[1] Scribner log scale

487976° 43——5

The Fire Problem

FLAMES have eaten a tattered pattern across the map of northern Idaho. Signs in the timber bear evidence of the extensive fires in times beyond the memory of living man. For the shorter period since the advent of early settlers and prospectors, the records cover thousands of small fires, many large ones, and a few all-consuming conflagrations. It is known that during the past half century far more forest land has been burned than has been logged.

To picture the fire situation, one should think of the losses occurring not regularly year after year, but in waves. Comparatively small fire losses for a number of years have usually been followed at unpredictable intervals by peak burning conditions and a fury of fire that leaps to disastrous proportions. This state of affairs tests the mettle and nerves of the fire-control organizations and makes fire risk a discouraging item in the forest management of northern Idaho.

In the 30-year period, 1910–39, six years have been commonly considered as critical, in which the losses have been catastrophic. Probably the most famous as well as the most disastrous burns were those of 1910, collectively known as the "1910 fire" (fig. 29). Killing 77 men and casting a smoke pall into the Middle West, these fires covered an estimated 1.9 million acres in northern Idaho, and destroyed 6 billion board feet of saw timber. It must be recognized that the damage estimates of that time were crude and possibly high. Yet the devastation of nearly one-fifth of the forest area in a single year is so many times greater than the forests can stand and still support a forest industry, that no possibility of overstatement can minimize the seriousness of the threat to the industry at that time.

A similarly critical combination of physical factors occurred in 1919, and approximately 1 million acres burned over within the national forests alone.[7] With the 1910 holocaust still lingering in public memory, interest and opinion then reached the point where greater funds, both public and private, began to be made available for fire protection. In each of the years 1926, 1929, 1931, and 1934, burning conditions again reached the critical point, and large areas of timber were consumed by fire (fig. 30). Constant improvement in the fire-protection facilities and organization was, however, reflected in losses very much smaller than in either 1919 or 1910. For example, 1931 is ranked by some authorities as potentially as bad as 1910, yet the acreage loss within the boundaries of the national forests was 92,000 acres as compared with 1,590,000 acres.

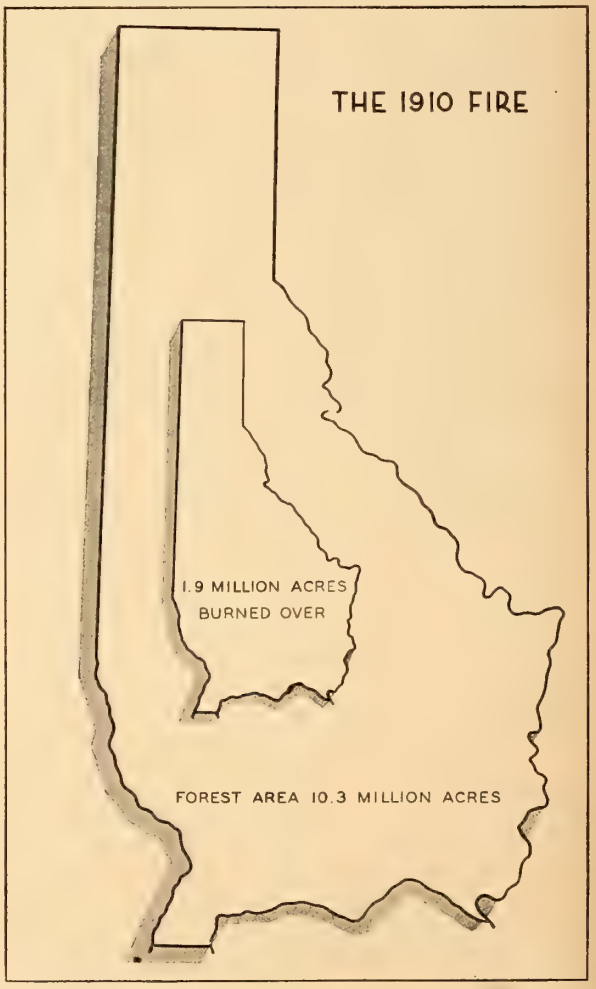


FIGURE 29.—*The great devastation in 1910 was the result of extremely severe weather conditions plus an inadequate protection system.*

[7] Because some of the national forests lie in more than one State, the estimates of area burned and protection costs for the national forests cannot, in all instances, be broken down exactly along State lines. The fire drain estimates given later, however, apply to all the national-forest area in northern Idaho and no more.

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FIGURE 30.—*While much moisture ordinarily falls as snow in the winter, the summers in northern Idaho are hot and dry as a rule. In the critical seasons vast areas of tinder-dry forest have been transformed from green to ash. The Freeman Lake fire of 1931 started one morning and spread to 20,000 acres by 11 p. m. the same day—1,600 acres an hour for 12½ hours. A combination of the "right" conditions enabled the Selway fires of 1934 to cover 252,000 acres before being corralled.*

The magnitude of the area loss during 1934 (324,000 acres) is a reminder that it may be economically impracticable to pinch off the large fires completely, particularly on the national forests, where 80 percent of the fires are lightning-caused and often relatively inaccessible. As will be shown later, however, even with the less satisfactory accomplishment of 1934, definite progress has been made.

Development of Fire Protection on National Forests

To appreciate the progress that has been made in fire protection, one must consider northern Idaho as it was in 1910 and as it is today. The development of national-forest fire protection may be used to illustrate this progress. In 1910 the greater portion of the forest area was relatively inaccessible. In the 6 million acres of national forest, there were but 29 miles of Forest Service roads. Compare that with 3,928 miles in 1938. The detection system was equally rudimentary. There were few lookout stations and those often without telephones to report to the ranger, who in turn had neither men, tools, nor transportation facilities adequate to cope with the situation. In no way was the fire organization equipped for the early detection and fast, strong attack that recent experience has shown to be absolutely essential during critical fire seasons.

The long-time fire job for three decades has been to expand the road and trail network, to construct almost from scratch a detection system, and to train a competent suppression organization—a prodigious task requiring a heavy capital investment. The results of this effort are favorably apparent in the reduction of area burned. In figure 31 this progress is illustrated in a general way by comparing one of these factors—road mileage—with th area burned during bad fire years.

Two of the six critical fire years referred to have fallen in each of the three decades (fig. 32). In the latest decade (1930–39) the average annual area burned was but 47,000 acres, as compared with 277,000 acres in the first decade. The periodic strain upon the fire organization can be imagined from the fact that in the 2 bad years of the latest decade 415,000 acres burned and in the eight "easy" years only 56,000 acres burned. In one way, the segregation of "easy" and "bad" years on the basis of the acreage burned tends to obscure some of the progress which has

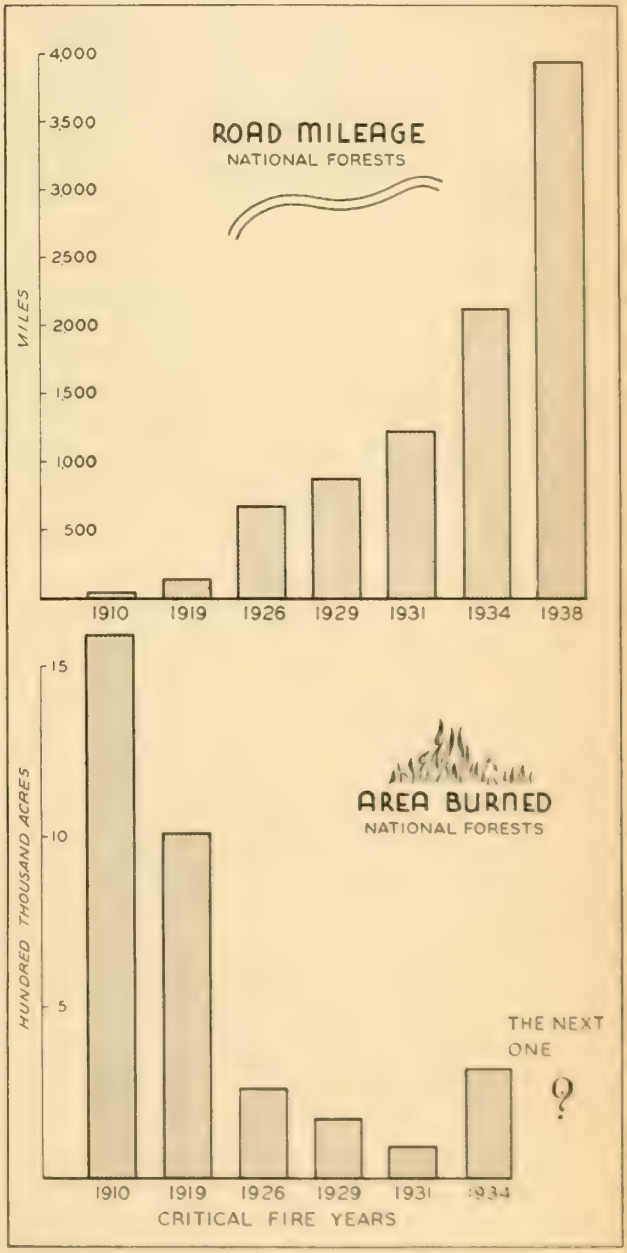

FIGURE 31.—*On national forests the expansion in road [illegible] tive of the general improvement in pre[illegible] it possible to decrease burned area in the critical [illegible]*

been made. For example, 1939 was more or less normal in regard to area losses. Yet if an effective organization had been lacking, the area burned very likely would have reached such proportions as to class the season as "critical."

Adequacy of Fire Protection

The examples of this discussion so far have been confined to the area protected by the Forest Service, primarily because the data for this area are more complete as well as more accessible. But the progress in the protection of other forest lands has been more or less parallel. Measured solely on the basis of the ratio of area burned to area protected, the outstanding fire-control record of recent years is that of one of five organizations financed by private timber owners, the Clearwater Timber Protective Association.

The earliest effort at cooperative fire protection was undoubtedly that of the Slate Creek Settlers Association, now extinct, organized during 1904 in what is now Shoshone County. The Clearwater Timber Protective Association and the Coeur d'Alene Timber Protective Association were organized in 1905. These were among the earliest attempts of timber owners in the United States to unite in the protection of their forests. The effectiveness of these and later purely voluntary groups was strengthened by the Fallon fire law in 1907 and by subsequent legislation, but the credit for their organization belongs with the timber owners themselves. These efforts represent a very practical private contribution to forest conservation. It is worth mentioning further that most of Idaho's progressive forest legislation has been introduced at the instance of these timbermen and supported by them.

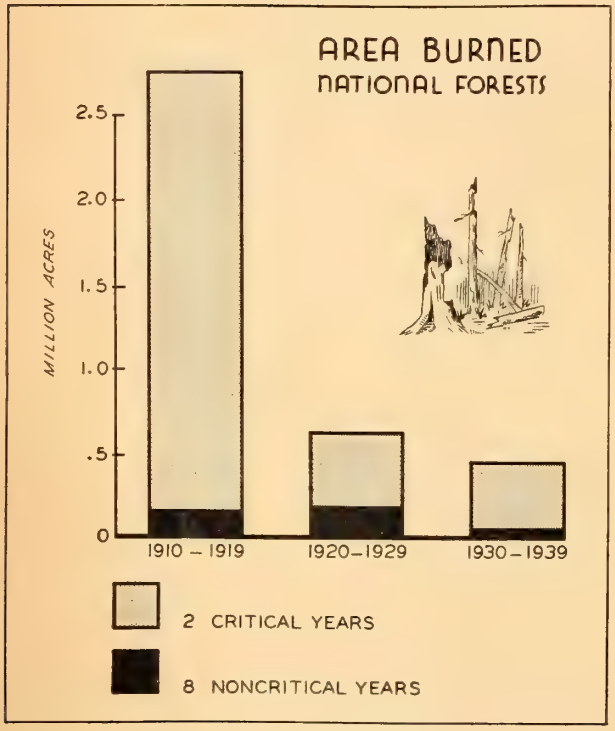

FIGURE 32.—*Two years in each of the past three decades have earned northern Idaho its reputation as a "hot spot."*

The five associations operating today are listed below, together with the estimated gross area of forest land protected by each in 1939:

	Acres
Clearwater Timber Protective Association	506, 000
Potlatch Timber Protective Association	464, 000
Pend Oreille Timber Protective Association	353, 000
Priest Lake Timber Protective Association	215, 000
Pine Creek Timber Protective Association	58, 000
	1, 596, 000

Extensive protection by the State, with its own organization, is spread rather thinly over another 1.6 million acres.

In the area protected by the Clearwater Timber Protective Association, the average annual acreage burned over during the period 1931–38 was held to the exceptionally low rate of 8 acres in 10,000. If the exceptional losses of 1931 are excluded, the record of the Potlatch Timber Protective Association is also very good.

For all of the five timber protective associations as a group, the average annual fire loss was 41 acres in 10,000. Data obtained from the office of the State Forester show for the period 1931–38 the acreage burned annually per 10,000 acres protected to be as follows:

	Acres
Clearwater	8
Potlatch	43
Pend Oreille	85
Priest Lake	32
Pine Creek	86

The fine record of the Clearwater Association is the result of strong emphasis on prevention, adequate coverage by lookouts and firemen, hard hitting during initial stages of fires, and development of adequate transportation and communication systems. Also, the existence of a high proportion of green saw timber within the association boundaries has made protection somewhat easier than in the other protective units having considerable cut-over land. Because of the high standards developed up to the present time, the good record in the Clearwater may be expected to be maintained even when the proportion of cut-over land is greatly increased.

Complete information on the area given more or less extensive protection by the State is not available. The situation for this area as a whole, however, is not so good, since the kind of protection possible with the funds available is not sufficient to prevent large losses in the occasional bad fire years.

The fire losses on the national forests during the same period were 71 acres in 10,000. Comparison between this figure and the 41-acre achievement of private associations should not, however, be taken as an index of relative

FIGURE 33.—*National forests have made a far worse showing in ratio of acres burned to acres protected than have private lands, but the National forests have a greater proportion of noncommercial timber on rugged, inaccessible areas where roads are few and no communities are present to furnish fire fighters. Even so, fewer fires are now "big ones" and fewer years are "bad ones" than in past decades. (Courtesy of 116th Photo Section, Washington National Guard.)*

effectiveness. There are too many factors to be considered, of which two are of especial significance. First, the country in which these public forests lie is for the most part more rugged than the remainder of the forest land in northern Idaho, more inaccessible, less adequately broken up by roads, and more sparsely provided with potential fire fighters (fig. 33). Second, lightning is a very much more important cause of fire within the national-forest boundaries than outside. Man-caused fires are more likely to occur in settled areas or along transportation routes, but lightning strikes in no such pattern. As the speed of attack is one of the most important elements of fire control, the lightning fire will continue to account for larger losses on the national forests, until such time as the airplane or other means may overcome the factor of inaccessibility.

One of the most evident truths in forest-fire protection is that greater burns can be tolerated on poor land than on valuable areas. The Forest Service as long ago as 1930 recognized this value distinction and attempted to put it on a numerical basis.[8] It was reasoned that whereas an annual fire loss in noncommercial forest as high as 120 acres in 10,000 may be tolerable, an annual burn in the white pine type of more than 10 acres in 10,000 is not. The tolerable or allowable losses for each of the other forest types were placed within this range.

It is obvious, then, that the national-forest area of northern Idaho, one-half of which is noncommercial, can tolerate greater losses than the area in other ownerships, of which only one-tenth is noncommercial. How much greater cannot be stated precisely from available statistics, but on the basis of 1930 standards the estimated tolerable annual burn within the five protective associations as a group is 25 acres per 10,000 and that for the national forests as a group is 70 acres.[9] These are, of course, by

[8] WASHINGTON CONFERENCE OF DISTRICT FORESTERS. COMMITTEE REPORTS. [U. S. Forest Service], 101 pp., illus. Ogden, [Utah]. 1930.

[9] The forest-type statistics are not compiled by protective districts. However, most of the land protected by the Forest Service is national forest and most of the land protected by the associations is private, State, or county. Therefore, the tolerable burn for the area protected by the Forest Service was assumed to be the same as that for the national-forest land alone. The bulk of the area protected by the two associations lies in Bonner, Latah, and Clearwater Counties. Therefore, the tolerable burn for the protective associations was calculated on the basis of the acreage of the various types held by all owners, except national forest, in these three counties.

no means absolute figures; 30 acres in 10,000 instead of 25 or 65 instead of 70 may be fairer estimates of tolerable burn. These standards are, however, indicative of the general situation, regardless of what arbitrary values are used as a starting point.

Despite the size of the losses and because of the great low-value acreage, it may be concluded that protection on the national forests, measured by the ratio of area burned-over to area protected, is more nearly adequate (71/70) and that the protective associations as a group have farther to go (41/25) to come up to the same standard.

The reader should be very cautious about drawing inferences from the preceding comparison. Just one thing was measured—the extent to which the national forests as a group and the protective associations as a group are succeeding in keeping fire losses down to tolerable maximums arbitrarily assumed on the basis of the values at stake. The protection problems differ. As will be shown, the Forest Service spends more money per acre in fire control than do the associations. Which group is doing the better job of fire protection and is receiving the most per dollar expended is another matter.

Costs of Fire Prevention and Control

The progress which can be shown for 30 years of organized effort has been realized at no small cost. Since the national forests extend over the State line, it is impossible to be precise concerning total expenditures. In 1938 the total direct outlay for fire prevention and control in northern Idaho was approximately $500,000. In each of two critical years, 1931 and 1934, the fire bills were more than $1,000,000.

In 1931 the cost of suppression only within the national forest boundaries amounted to 13 cents per acre protected, and in 1934, 17 cents per acre. For the 8-year period 1931–38 the average cost was 4.8 cents. To this highly variable expenditure for fire suppression should be added the relatively stable direct charges for preparedness, such as the cost of lookout men and fire-patrol men. These expenditures have been increasing during the recent years with the development of a more effective organization (fig. 34). For the entire period 1931–38 they averaged 3.9 cents per acre per year. The average total direct cost, then, for fire prevention and control on the northern Idaho national forests was 8.7 cents per acre per year.

The annual cost of forest protection by the cooperative associations and the State in the same period was 5.7 cents per acre. The annual cost of the Clearwater, Potlatch, and Priest Lake Associations, which have made relatively good protection records, was 7.8 cents per acre.

To the extent that the number of "million-dollar fire years" can be reduced, the additional investment in preparedness is thoroughly justified even without considering timber losses.

It should not be assumed that the protection costs are evenly divided among the forest-land owners, for the Idaho law does not require an owner residing within 1 mile of his forest land to pay protection charges. Also, in recent years, the State has not taken advantage of its legal right to assess the property owners in the State protection districts. The following tabulation contains a Forest Service estimate of the ratio of the paying acreage to the gross acreage in the fire-protective associations and districts in 1937:

	Percent
Clearwater	78
Potlatch	93
Pend Oreille	49
Priest Lake	97
Tesemini (discontinued)	62
Pine Creek	67
State districts	0

To some extent, the burden on State and private owners is relieved by Federal aid under the provisions of the Clarke-McNary Act. The average annual direct Federal contribution to fire protection on private lands from 1935 to 1938, inclusive, was $46,000, or 1.5 cents for every acre given organized protection. The actual contribution, however, has been greater than this, since C.C.C. assistance has in these years been available for fire protection.

Although estimates similar to this 8.7 cents per acre per year of so-called direct cost of fire protection are sometimes held up as a total measure of the fire costs on the national

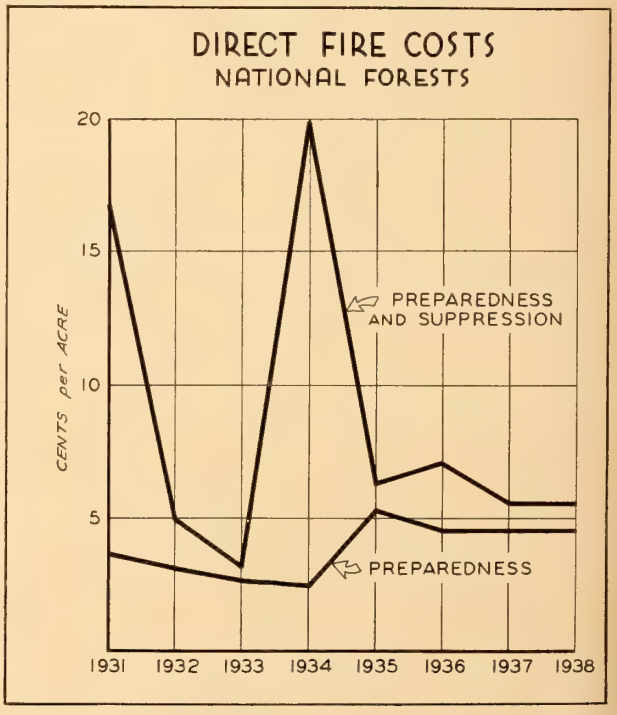

FIGURE 34.—*The direct cost of fire protection within the national forests will vary from less than 5 cents an acre up to 20 cents, depending on the severity of the year.*

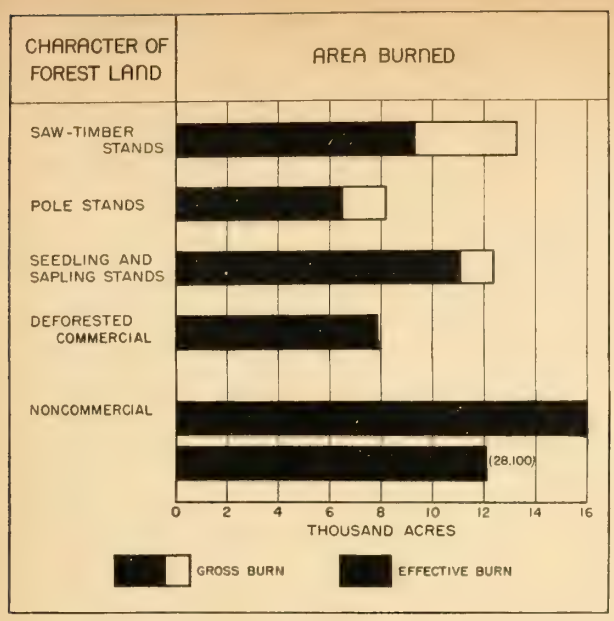

FIGURE 35.—*Average gross acreage of all ownerships burned annually 1931–37 (total all types, 69,900 acres) and the equivalent complete destruction or effective burn, on the forested areas.*

forests, a realistic appraisal requires the inclusion of other items. National-forest roads serve many uses, but the system has been constructed primarily for one purpose—fire protection. Therefore, part of the depreciation and maintenance cost of these roads is as much an item of fire-control expense as the actual labor charges on the fire line. The same is true for the cost of construction and maintenance of fire-guard stations, telephone lines, and other protection facilities. A portion of the administrative overhead also is chargeable to fire. According to Forest Service cost keeping, 68 percent of the costs for all administrative purposes in northern Idaho in 1938 were directly or indirectly chargeable to fire protection. On this basis, the total average annual fire cost in the national forests is actually around 21 cents per acre instead of 8.7 cents.

Losses From Fire

The complete toll to fire includes not only the out-of-pocket costs for protection of the total area but also the values destroyed on the areas actually burned—the loss of wages, profits, and freight revenues. During the period 1931–37 an average of 69,900 acres of forest land of all ownerships was burned annually. The fact that 40 percent of this was noncommercial, whereas only 34 percent of the total forest area is noncommercial, indicates the relatively greater fire losses in the back country. Since bad fire years have occurred two per decade since 1910, this average burn, based on a 7-year period that contained two bad years, might be considered somewhat too high. It must be remembered, however, that these are "yardstick" figures and nothing more.

One measure of values destroyed by fire is the size of the timber. Another is the actual destruction within the gross area burned. In figure 35 the commercial forest land burned is divided into four classes based on timber size. The gross area burned in saw timber, pole, and seedling and sapling stands (33,900 acres) does not, however, represent the area added to the deforested total each year. Contrary to the common concept of a forest fire in northern Idaho as all-destroying, leaving only waste in its wake, not all of the timber within fire lines is actually destroyed. To allow for areas missed and stands only scorched or partially killed, the total figures just shown must be discounted somewhat. These discounted losses may be expressed in terms of effective area killed annually, as follows:

	Acres
Saw-timber stands	9,300
Pole	6,500
Seedling and sapling	11,100

In other words, although 33,900 acres were burned over in these forested stands, the actual losses were equivalent to complete destruction of the stands on only 26,900 acres.

It has been previously shown that the green saw-timber cut from the forest amounts to 624 million board feet yearly. In contrast, in 1931–37, an average of 91 million board feet (log scale) of saw timber was killed by fire each year, the losses by species being western white pine 15.3, ponderosa pine 8.9, and other species 66.7. The effect of fire on the sustainable cut is even greater, as allowance must be made for the losses in young stands.

It is not strictly accurate, however, to speak of timber killed in the sense of absolute economic waste, because much is salvaged for fuel wood and smaller volumes for other products. Very little duplication is involved between cutting-drain and fire-drain estimates, however, since all but a small and indeterminate portion of the dead-cut wood has been eliminated from the cutting-drain figures.

Planting

It was pointed out in the forest inventory discussion that nearly 1 million acres of commercial forest land is now deforested and that, owing to double burns, much of this area is likely to remain in a nonstocked condition for some time. Considering the extensive acreage which has been burned since the beginning of the century, this seems a reasonably small figure. The forests of northern Idaho have exhibited a fortunate tenacity in restocking following single burns, as is testified by the almost 2 million acres of stands under 41 years of age. This restocking has resulted principally from natural regeneration, as only 59,000 acres of better areas were successfully planted between 1909 and 1938—all by the Forest Service on national-forest

land. A planting cost of some $13 per acre probably will preclude much expansion in the planting program. Natural vegetation must, therefore, be chiefly depended upon to cover the scars of a turbulent fire history.

Slash Disposal

The subject of forest fires and their control is not completely covered without mention of slash disposal. At best, the western white pine forests are considerably short of being fireproof, as the raging fires of the past have borne witness. But after logging, with the forest floor covered with a mat of limbs, tops, and fallen trees, the hazard is infinitely greater.

Partly because the very volume of the debris sometimes interferes with reproduction, but primarily because it constitutes such a fire menace, measures to render this logging slash less harmful have been necessary. On the national forests, piling and burning the brush has been the standard practice for many years. The Idaho forestry law requires this type of slash disposal and the State forester is responsible for enforcing the minimum requirements of the law.

The Idaho law, which went into effect in 1925, has immeasurably bettered the slash-disposal situation, but even so, it is generally admitted that it has not functioned so well as desired. Some compliance has been excellent, in other cases it has been relatively poor. In many places, the burning slash piles have damaged the residual stands. In some instances, the fires have escaped control and inflicted great destruction. In fact, there are a few cases where slash disposal has differed from forest fire in name only.

There is disagreement as to the remedy for this situation. One school of thought believes that piling and burning is the only practical solution to the problem and that, if the timber operators complied in full spirit, disposal could be accomplished effectively without material losses. On the other hand, some feel that complete hazard reduction cannot be achieved with fire without some damage and hence some means of hazard reduction not requiring the complete burning of slash would in many cases be more satisfactory. The problem is essentially one of cost; if that were not an important consideration, practically all logging slash could be burned satisfactorily.

It is sufficient here to note that slash disposal is an important element of fire protection, that its effectiveness needs to be increased, and that, no matter what provisions are finally agreed upon, full and satisfactory compliance will not be achieved without a sufficiently large State organization for supervision—which there is not now.

The Disease and Insect Problem

FIRE is only the largest of the three chief factors of forest destruction in northern Idaho. Two companion scourges, disease and insects, must be battled if man is to obtain the maximum of benefit from the forest.

White Pine Blister Rust

The white pine blister rust was accidentally introduced into British Columbia from Europe in 1910. From Canada it worked southward, reaching northern Idaho in 1923. Since then, infection has spread throughout the western white pine belt of the State.

The subtlest weapon of the white pine blister rust is its unheralded approach. It casts no billow of gray smoke into the summer sky. It makes no open threat to lives and property. The very indirectness of its mode of attack has impeded the mobilization of public opinion for its control. Yet this disease is so deadly, once it has taken hold, that it is in some respects a greater threat to the western white pine industry of tomorrow than is fire (fig. 36).

Blister rust is a parasitic fungus disease affecting the five-needle pines, of which western white pine is one. It spreads to pine from currant and gooseberry plants, enters the tree through the needles, and grows in the inner bark. Once in the bark, the canker spreads in two directions, around the branch and toward the tree trunk. If the branch lacks vigor or the point of infection is far from the bole, the branch may die before the disease reaches the trunk and the spread will be halted. In very young trees with short lower branches, infection soon results in death. The older the tree, the farther the needles are from the lower part of the trunk and the fewer there are near the ground where infecting spores are most abundant; also the more likely the tree is to shade out the plants from which the infection comes. Consequently, the older trees are less likely to be attacked; points of infection are fewer and less dangerous, and the trees are better able to withstand killing of branches and loss of needles. Even without control work, it seems probable that some of the younger western white pine stands would reach maturity where sources of infection are locally light, and that a considerable proportion of the stands above perhaps 60 or 80 years would escape serious damage in the period before logging.

Pathologists say of blister rust that "Without control white pine cannot be perpetuated in this region"[10]—commercially speaking, of course. Because no extensive losses have yet resulted, this appears to be a strong statement. But these pathologists have been able to forecast the course of the disease up to the present time, and it therefore appears that this warning is worth heeding.

FIGURE 36.—*Young white pine stands, such as this, are threatened with elimination from the commercial forest classification unless white pine blister rust is kept in check.*

Control Efforts

The control of blister rust is possible and practicable because of the alternate host required for its development. White pine blister rust is never transmitted from pine to pine, but always from pine to species of ribes (wild currant and gooseberry plants) on which

[10] SWANSON, H. E. [illegible] THE INLAND EMPIRE [illegible] 1939.

the disease goes through part of its life cycle, and so back to pine. Thus, the spread of the infection follows a series of circles, and so long as these remain unbroken the disease cannot be halted.

The spread from pine to ribes may range over 100 or 150 miles, but that from ribes to pine must be within about 1,000 feet. Consequently, the control has attempted to break the circle of development by eliminating as many of the ribes as practicable from western white pine lands, especially from young stands. Since wild currant and gooseberry plants are prominent components of the western white pine type, this is a task to stagger the imagination.

Between 1923 and 1939, more than 351 million of these plants were uprooted by hand. This is the principal means of eradication (fig. 37), although several other methods have been developed to meet special conditions. By all methods combined, the eradication program had covered, by January 1940, 1.6 million acres of western white pine land in northern Idaho. Because of particularly heavy occurrence of ribes on some lands, 229,000 acres have had to be worked twice and 19,000 acres three times to secure adequate control. The Office of Blister Rust Control of the Bureau of Entomology and Plant Quarantine and the Forest Service estimate that protection can be justified on 0.7 million acres as yet unworked, on which, pathologists point out, the disease is advancing rapidly. In addition, a portion of the area already treated will have to be reworked before adequate control will be established.

It should not be assumed that the completion of this program will be the final chapter in blister rust control. The attempt to eliminate the ribes completely is rendered futile, for one thing, by the longevity of ribes seed. Evidence indicates that wild currant and gooseberry seed, under proper conditions, may retain their germinability for more than a century. The opening of a stand and the disturbance of the forest floor by logging, fire, or other cause induces this dormant seed to germinate and establish a new crop of ribes. The problem, therefore, is one of reducing the ribes population to the point where western white pine can be grown commercially on western white pine areas, and then keeping it there by further control as required.

Control Costs

Covering the 1.6 million acres already worked foot by foot has been a big and expensive job, which can be justified only because the value of the western white pine timber jeopardized is large. It is estimated that from 1922 through 1939, in all of the projects related to blister rust control work in northern Idaho, $8,859,000 was spent. Besides actual eradication, this includes research, quarantine work and surveys. By and large, it has been publicly

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FIGURE 37.—*A big job—351,000,000 ribes plants have been pulled out by hand, as recorded photographically in this instance by the Bureau of Entomology and Plant Quarantine.*

financed, the greater part of it under the various emergency relief work projects, as the following tabulation shows:

Regular funds. U. S. Bureau of Entomology and Plant Quarantine (1922–39)	$1,111,000
Regular funds. U. S. Forest Service (1930–39)	1,798,000
Public Works Administration (1933–34)	1,840,000
Work Projects Administration (1935–39)	3,038,000
Civilian Conservation Corps (1933–39)	862,000
State and Private (1928–39)	210,000
Total	8,859,000

It has been estimated by the Bureau of Entomology and Plant Quarantine and the Forest Service that approximately 9.7 million dollars more will be required through 1948 to complete the control work in northern Idaho and place it on a maintenance basis, or, for the western white pine area as a whole, $8 per acre, as follows:

Past expenditures in northern Idaho	$8,900,000
Proposed necessary expenditures	9,700,000
Total	18,600,000
Per acre on 2.3 million acres	8.00

This is the expenditure necessary to establish control of the disease on areas now containing stands of western white pine of all age classes, and on such new areas as may come into western white pine by 1948. The subsequent maintenance of control will be primarily a reworking of areas cut over or burned over after 1948, on which western white pine germination takes place. A certain amount of rework will also be required along stream bottoms where the ribes were particularly thick and are persistent. Naturally the maintenance costs will vary from year to year depending upon the extent of fires and logging. Any estimate of these maintenance costs contains a large element of con-

jecture, but it will probably be necessary to spend about 10 cents per acre per year on the average, or $230,000 annually.

The question has been raised more than once as to the justification for so expensive a blister rust control program. A proper answer requires consideration of the timber values involved along with other timber-growing costs, which have not yet all been presented, and therefore the analysis of this point is postponed to the chapter on economic factors. In this connection it should be remembered, however, that, unlike the damage done by fire, only minor watershed values and only temporary loss in recreation are at stake. It is the timber loss alone upon which blister rust control must be judged sound or unsound as a public investment.

Forest Insects

Insect pests of the forest are many and varied. Under normal conditions they cause an important and continuous drain upon the forests. On occasion, under the most favorable physical conditions, the infestation of an individual species will multiply itself into an epidemic often resulting in very large losses of potential revenue.

The mountain pine beetle (*Dendroctonus monticolae*) has been the chief insect depredator during recent decades in this region. Throughout the region it has killed an enormous volume of lodgepole pine, western white pine, and ponderosa pine. In northern Idaho its chief offense has been the killing of much valuable western white pine. It is estimated by the Bureau of Entomology and Plant Quarantine that an average of almost 91 million board feet (log scale) of western white pine saw timber has been killed annually by the dendroctonus beetles during the past 10 years.

An attempt has been made by the Forest Service on a relatively limited scale to curb the rise of these epidemics. In a control program concentrated principally on the Coeur d'Alene National Forest, infected trees have been located and the beetles destroyed. This approach to the problem is based on the theory that if the infection points can be reduced, the possibility of flare-up and large timber losses will likewise be reduced. Between 1923 and 1938 approximately $361,000 was spent in insect control in northern Idaho. Except for $2,000 of private funds it was all Federal money. The average for recent years has been $35,000 annually.

Too few factors can be pinned down to make it possible to assay the exact value of control efforts. Some of the timber killed is overmature, and in such cases the immediate cause of death is not important, for if bugs do not do it something else will. The same thing applies to some of the young timber. In the normal young stand, competition is continuously eliminating individual trees as the available growing space decreases. These trees softened by competition may be finished off by insects or disease. Any insect-control work on trees which would die in a year or so anyway would obviously have no justification. The value of control lies in preserving till time of harvest those trees capable of living 20 to 50 years. Experts agree that past insect-control work has saved much of such western white pine and that the money has been well spent.

In setting up a reasonable insect-control program for the future, the factors which have already been mentioned should be considered and also the fact that the cost of controlling attacks in certain areas would be too expensive to be practical. Ninety-one million board feet is the estimated annual loss of western white pine from *Dendroctonus monticolae* in northern Idaho. The Bureau of Entomology and Plant Quarantine estimates that it is economically feasible to control infestations sufficiently to prevent the loss of 45 to 50 percent of this timber. The possible cost of $150,000 annually is considerably lower than the stumpage value of the timber saved for later logging. Even if the cost equalled the stumpage value, the community would benefit by the $25 or $30 per thousand board feet produced in the manufacture of this timber. The Bureau feels that it is conservative in setting the upper limit of annual control expenditures at $100,000, which is about $65,000 more than is being spent at present.

As the road systems of northern Idaho become more completely developed, it will be possible through partial logging to utilize many trees that would otherwise be lost. With control by utilization on some areas, the amount of money needed for the present kind of control would decrease.

Forest-Management Possibilities

Forest Increment

ESTIMATES of forest growth in northern Idaho have been made numerous times in the past, but most of these were based on general opinion and fell wide of the mark on the low side. According to the Forest Survey, growth adds each year 636 million board feet to the commercial saw-timber volume. That figure includes the volume added to saw-timber trees, and also the volume of those smaller trees which during the year have moved up into the saw-timber class through increase in diameter. It is a net estimate after normal losses from shading, insects, disease, and miscellaneous causes (except fire) have been deducted. In the tabulation below[11] the current annual growth is shown by species:

	Million board feet (log scale)
Western white pine	164.9
Ponderosa pine	92.7
Western larch	83.7
Douglas-fir	126.3
Grand and alpine firs	85.7
Western redcedar, including poles	27.3
Western hemlock	9.3
Engelmann spruce	24.4
Lodgepole pine	22.1
Total	636.4

The present rate of accretion of 636 million board feet is by no means the maximum to be expected from this commercial-forest area. There are approximately 1 million acres of nonstocked land and 1 million acres of overmature stands on which no net growth is taking place. If all the nonstocked and understocked areas were properly stocked, if the nongrowing saw-timber stands were replaced by growing stands, and if the age classes were properly distributed, a maximum increment of 1.6 billion board feet annually might be achieved—2.5 times the current rate. Although no such high figure is likely to be realized it is within reason to expect with proper management a much larger current annual growth than at present.

[11] CUMMINGS, L. J., AND KEMP, P. D. FOREST INCREMENT IN NORTHERN IDAHO. North. Rocky Mountain Forest and Range Expt. Sta. Forest Survey Release No. 18, 74 pp., illus. 1940. [Processed.]

Fire and cutting together are taking each year 715 million board feet of saw timber, or 79 million board feet more than the current annual growth.

Determination of the Allowable Cut

The primary question behind all the growth and drain calculations is this: What is the maximum cut of timber products which can be maintained permanently, and to what extent does present production overrun or underrun this figure? Unfortunately, the difference between the current annual board-foot increment and the losses from fire or other causes do not necessarily indicate the volume of timber which should be cut each year. Suppose, for instance, that a given forest property is entirely covered with saw-timber stands 200 years of age and older. At this age the net growth is negligible, yet it is obvious that the permissible and desirable cut would be large, and that any comparison of current annual increment and drain would not be of practical significance. On the 1 million acres of overmature stands in northern Idaho, a current utilization far greater than the present replacement by growth is desirable.

Also, proper allowance is not made in this type of calculation for fire losses. For example, a fire in a seedling and sapling stand results in no board-foot loss, since the trees are below saw-timber size; and it would appear from the calculation *increment minus fire drain equals allowable cut* that no reduction in the saw-timber cut would be necessary for fire damage in these young stands. Yet it is obvious that for every acre of such forest land burned, the present cut in saw-timber stands must be reduced by some fraction of an acre if a stable cut is to be maintained.

In view of the errors this formula invites, the allowable annual cut has been calculated for northern Idaho upon a different basis, which might be termed area regulation. This method has the advantage of simplicity. Therein also lies its greatest weakness, for being simple it is not precise. However, despite its crudeness, this calculation does weigh all of the major factors and is admirably suited for the purpose at hand. The following discussion is primarily devoted to the results obtained by this method, but the reader may check the calculations and reasoning by referring to the appendix.

The Rotation

Equally as important as the calculations are the assumptions upon which they are based. Of these assumptions the rotation has the greatest influence on the allowable cut. The proper rotation is a matter of considerable debate. Some feel that a 100-year-old or younger crop will be readily marketable, and others believe that a rotation period upward of 120 years must be adopted. For the purpose of calculation in this report, a 120-year rotation is arbitrarily chosen. The determining factor will, in the end, be the nature of the markets for the northern Idaho timber products. At present the principal outlet is for lumber, sold as boards or match blocks and other remanufactured products in the eastern and middlewestern States. Competing as it is with other producers more favorably situated, the northern Idaho industry has been able to continue largely because of a superior product. For the most part, it seems that this quality product cannot be raised in any shorter period than 120 years.

At an age of 120 years about the best that can be expected from reasonably well-managed young white pine stands over an extensive area is thought to be 12 M board feet per acre of western white pine, but this may be low. The average for northern Idaho as a whole—old and young saw-timber stands combined—is 9.3 M board feet. This includes many poorer stands, however, the best having been logged first. In the Clearwater district, where a large part of the original timber is uncut, western white pine stands average approximately 12 M board feet of western white pine per acre.

Sawlog-size trees begin to appear in western white pine stands at 60 to 80 years. Some of these young stands are being logged at the present time. Apart from the fact that the market probably could not absorb much of such timber, the liquidation of these younger stands is unfortunate and not evidence of the desirability of a short rotation. To have them cut just as they enter the period of heavy volume growth constitutes a real loss to the community. On the other hand, partial logging, which would leave a portion of the marketable timber in these stands to reach greater size and improve in quality, would be a very desirable management practice.

Method of Management

The utilization of any stand may properly be carried out in several different ways. One operator might cut everything, leaving a relatively clean area behind him. Another, to take advantage of growing conditions, might prefer to liquidate the stand in several cuts over a period of years and obtain greater yields. Reproduction may be present in some stands at the time of logging, but in many instances a period of years must elapse before adequate restocking is obtained. Not all of the possibilities and conditions can be fitted into a single pattern, but, as a rather extensive opening up of stands is necessary to insure the establishment of western white pine reproduction, the calculations here are based on one major harvest cut per rotation which would bring about even-aged reproduction. This method involves logging each acre only once in a rotation. In actual practice, it is desirable to vary the number of cuts and the kind of cutting to suit local conditions and thereby enhance the yields.

The Allowable Cut in Northern Idaho

If it were not for the fire losses, the total cut of all species (excluding cedar poles) could be permanently maintained at 689 million board feet per year or almost 20 percent more than the present cut (see appendix). But because of fire, the allowable annual cut is only 518 million board feet (fig. 38), or considerably less than is now being produced. While fire damage in young stands is often passed off as something of minor importance, it is noteworthy that 39 percent of the reduction from 689 million to 518 million board feet is because of fires in seedling, sapling, and pole stands.

The lopsided utilization under which western white pine bears the brunt of the logging has been pointed out in preceding chapters. As a group, the species other than western white pine are not being used to the extent they should be. The cut of these could be increased by 149 million board feet yearly without taxing forest productive capacity. With western white pine, the story is entirely different. The allowable annual cut is 140 million board feet and the actual log cut 351 million board feet—2½ times as great. If a start at sustained yield had been made some years ago, the allowable production would have been higher. If present fire losses were eliminated,

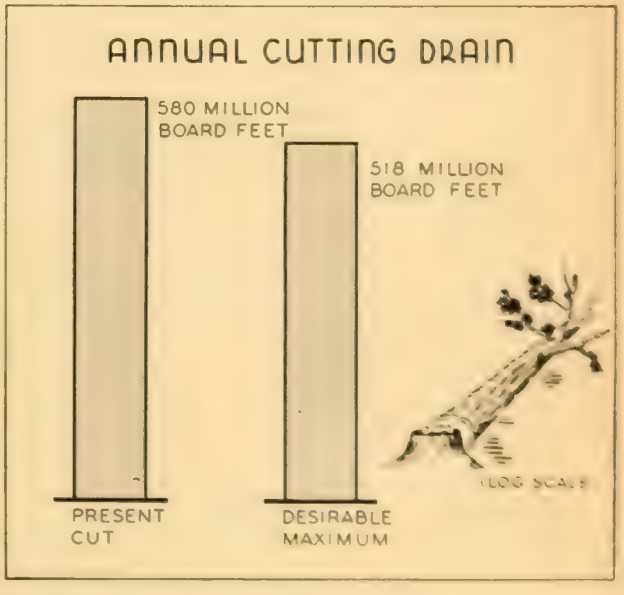


FIGURE 38.—*The annual cut of all species is somewhat greater than can be sustained with present fire losses.*

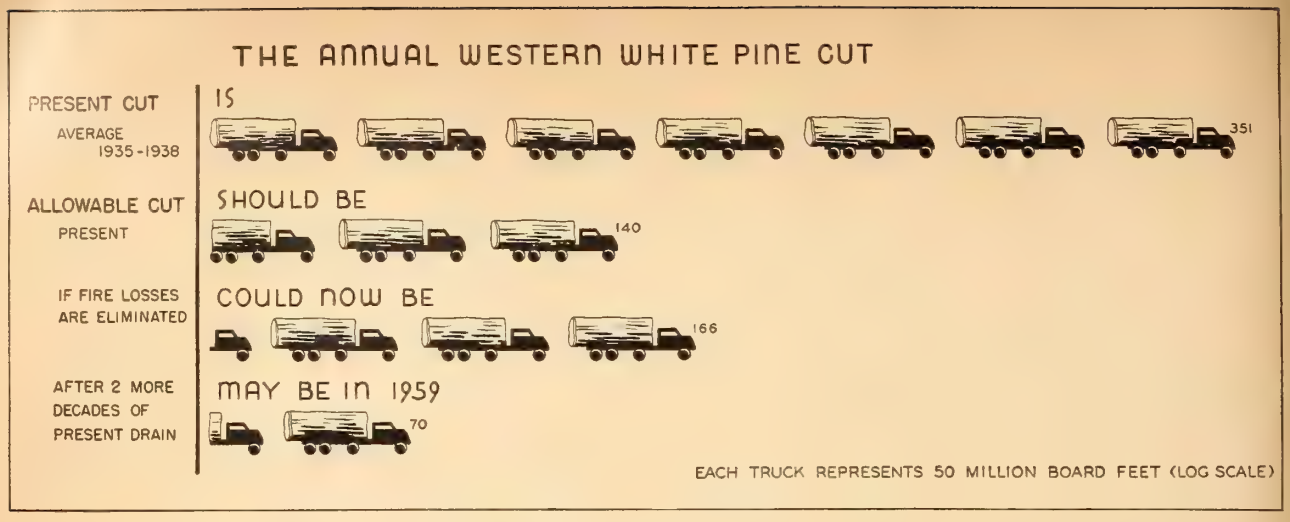


FIGURE 39.—*The more western white pine cut today—above an allowable 140 million board feet—the less there will be for tomorrow.*

it could be advanced now to 166 million board feet. Under proper management, the future production can eventually be stabilized at a still higher level.

Today there is a shortage of western white pine stands of the intermediate ages, and there will be a dearth of suitable timber in the future, unless cutting in the present saw-timber stands is so reduced that their volume is spread evenly over the years required for the present young stands to grow to maturity. The estimated allowable cut of 140 million board feet takes into account this necessary reduction. With the age deficiency reduced, but under present management practices, the present rate of losses from fire and other causes, and the present acreage of western white pine stands, the sustainable output of western white pine might rise to 200 million board feet per year. If losses were reduced, the sustainable production would, of course, be still higher.

If logging continues for another 20 years at the 1935–38 rate of 351 million board feet per year, and if the fire loss likewise remains the same, the age deficiencies will be greatly magnified by 1959 (fig. 39). If sustained production were instituted at that time, the allowable cut would be somewhere near 70 million board feet during the many years which would elapse before this great deficiency could be made up. This is just half of the present allowable cut and only one-fifth of the actual 1935–38 production.

The Forest Service is committed to sustained-yield production and is cutting 34 million board feet of western white pine annually (1935–38) as against a national-forest capacity of 47 million board feet per year. The great overcut of western white pine is on lands other than national forests. The present volume of western white pine on private and State lands is 6.3 billion board feet. It is being logged at the rate of 0.3 billion board feet per year. Thus, considering growth and fire loss, the present rate of production on private lands can hardly continue for more than 20 or 25 years.

The Problem of Reproducing Western White Pine

Despite disastrous fires and extensive logging in the past, the mountains of northern Idaho are still green-clad, for the most part, owing to the remarkable ability of the conifer forest to perpetuate itself. But it is one thing to obtain reproduction and another to secure the proportion of western white pine in this reproduction needed to maintain the present allowable cut of western white pine. Less than one-third of the 1.4 million acres of stocked, cut-over timberland in northern Idaho now contains western white pine stands. Since this species has been the lifeblood of the northern Idaho lumber industry for three decades, it seems reasonably certain that considerably more than one-third of this cut-over area was originally western white pine land. This shrinking area is a real problem of long-time forest management. Unless the full 2.4 million acres of the western white pine type continues to grow western white pine stands, and unless the proportion of this species continues to be heavy, the preceding management calculations of sustainable production are worthless for anything beyond the supply of commercial timber now definitely in sight.

The reason for this downward trend is threefold: (1) Western white pine reproduces best following single burns which eliminate competing growth, but logging frequently does not remove this competition. Residual stands of sawlogs, poles, or saplings of other species have retarded the successful development of western white pine reproduction. (2) In some stands an insufficient number of mature pines has been left for seed source. And (3) on some areas repeated fires have killed all reproduction that did start.

Two approaches are open to the problem of reestablishing western white pine following logging where competition

exists. The residual timber may be felled and burned and the area may then be planted or allowed to reproduce naturally. Or a sufficient portion of the residual stand may be disposed of to permit the establishment of western white pine from a continuing seed source in well-distributed pine trees, supplemented to some extent by seed stored in the forest floor. Either approach is costly, the former probably the more so. Yet it cannot be emphasized too strongly that unless some such practices as these are generally adopted, the western white pine industry will operate on a shrinking base.

The Forest Service has met this problem in part, although not all of the logged areas in the national forests have reseeded with western white pine. In general, the present policy is to avoid cutting saw-timber stands containing a substantial volume of sound trees of other species. The thought behind this policy is that the prices for the secondary species may improve sufficiently within the coming years to make them marketable. In such event, the problem of opening up the stands and obtaining western white pine reproduction would be partly solved. Under current practice on the national forests, the purchasers of timber deposit money in a special fund to be used for stand improvement work. This involves disposal of such defective saw timber and suppressed hemlock and grand fir as interfere with the reestablishment of western white pine.

Because of limited finances, the stand-improvement work on the national forests is confined to the best of the cut-over land. Although very little disposal work has been done on private lands, many cut-over tracts are coming back to western white pine. This is primarily because heavy logging has created conditions generally favorable for the species' regeneration, and there has happened to be an adequate seed source. No data are available to indicate what proportion of the area logged in recent years has passed from western white pine to some other type.

The economics of the situation undoubtedly does not warrant the attempt to perpetuate western white pine on all areas originally carrying stands of this species. The private owner may reasonably be expected so to protect his land during logging as to leave a green forest cover. It would seem unreasonable, however, to demand that he cut and burn at dead-weight expense a large volume of unmarketable residual timber purely to benefit reproduction in which he has no immediate interest. Even the public is not justified in spending the many dollars necessary to rid all of its logged land of inferior timber to make way for western white pine reproduction.

Local Aspects

The past heavy logging in the Sandpoint and Coeur d'Alene-St. Joe districts makes the attainment of sustained-yield management much less likely in these localities than in the Clearwater district. The age deficiencies are greater. Also, the western white pine saw-timber stands which remain are much lower in quality and volume per acre than those which have already been logged. As a result, the allowable cut of western white pine for all of northern Idaho except the Clearwater district is 64 million board feet per year, whereas if overutilization had not taken place, and even with the present rate of fire loss, the allowable cut would be something more than 100 million feet. It will be a long time before these deficiencies can be made up and a cut of 100 million feet or more sustained. In the period 1935–38 the cut of western white pine outside the Clearwater district averaged 159 million board feet annually.

A general feeling exists that the greater the volume of saw timber in any given area the more fortunate are the industry and the communities of that locality. From the public standpoint and over a long period of time it is probably more correct to consider an excessive volume of saw timber as a liability. It might be compared to giving the average improvident man his life income in one lump. The situation in the Clearwater district is a case in point. Fifty-four percent of this area contains stands over 100 years of age. Yet the cutting budget for permanent operation is comparatively little greater than if there were only a small fraction of that amount of saw timber and all the age classes were properly represented. Thus, to the average operator, this great excess of saw timber offers little except a temptation if not necessity to cut out and get out.

The average annual cut of western white pine in the Clearwater district during the period 1935-38 was 192 million board feet. In the period 1931-38, which includes the low depression years, the cut was 145 million. The allowable cut of western white pine from all lands in the Clearwater district is only 71 million board feet per year.[12] There exists, however, in this locality a real opportunity to make scientific forest management pay. A large area contains young western white pine saw-timber stands ideally suited to partial cutting. The western white pine trees remaining after judicious logging of this type increase rapidly in size and value, so that a second profitable cut can be made in possibly 20 to 40 years. This requires more than leaving the trees; those to be left must be carefully selected. If full advantage is taken of this opportunity for partial cutting it is possible that the present allowable cut might be raised as much as 20 per-

[12] It will be noted that the allowable cut of the Clearwater district added to that of the rest of northern Idaho falls several million board feet short of the allowable cut as calculated for northern Idaho as a single unit. This apparent discrepancy results because, in the latter case, the surplus of saw timber in the Clearwater district compensates for shortages elsewhere, but for the Clearwater district by itself the surplus does not materially increase the allowable cut.

cent, or to 85 million board feet per year. This increase is, of course, purely a speculation and probably a liberal one at that. In any case, the present cut is much greater than can be sustained.

At this point it is well to recognize that poor cutting practice is not necessarily a companion to overcutting. Potlatch Forests, Inc., the principal private timber operator in this district, has followed the practice of partial cutting on such of its timberland as was suited to this type of management, combined with good management of young stands. This company expects to be able to return to partially cut areas in two, three, or four decades, and thus receive a greater total yield per acre from two cuts than from one clear cut. It is apparently the only private concern in northern Idaho attempting this on a large scale.

Western white pine is being logged at a much more rapid rate in the Clearwater district than it can be grown. But in the opinion of the company cited, even though the western white pine timber cannot permanently sustain the present cut, it will be possible in future decades to lean more heavily on the secondary species and thereby continue in operation. There is certainly nothing unreasonable in this policy, but whether the other species will have improved enough in value during the next 20 to 40 years to offset the western white pine shrinkage depends upon factors to be discussed in the chapter on economic factors.

Cedar Poles

The cedar pole situation is more or less parallel to that just described for western white pine. The cedar pole is also a quality product actually worth more than pine lumber per board foot. Pole production is more sensitive to economic conditions and has fluctuated more widely as a consequence. The average drain upon this resource has exceeded the producing capacity over a period of years. As already estimated, the average annual drain of cedar poles and piles for selected years since 1925 has been 245,000 pieces. In 1937, which was a very good year, the output totaled 382,000 pieces. The present inventory (January 1, 1939) is 6.9 million poles, 6.3 million in sawtimber stands and 0.6 million in young stands. In a detailed analysis of the cedar pole problem, Cummings and Varney [13] estimated that almost 1 million poles will grow into utilizable size between now and 1958. With an annual cut of 245,000 poles, the resource would be approaching exhaustion in 32 years. At a rate of 382,000 per year, the period will be much shorter. They point out that, if a period of lean years is to be avoided, the present resource plus the additions up to 1958 should be spread over a 45-year period, or until the vast acreage of young stands reaches a usable size. From the average of 245,000 pieces yearly, it is desirable to reduce the annual cut to something like 180,000 pieces.

The Effect in Terms of Jobs and Dollars

In contrast with the prosperous twenties, the lumber industry decline has made the fourth decade of this century a hard one for the forest communities of northern Idaho. During 1929 the sawmills and logging camps furnished approximately 9,800 man-years of employment. With the production slump since then, many workers have had to turn to other means of livelihood and the work has been spread more thinly among those still dependent upon lumbering for income. An average of 6,000 man-years of employment was furnished during the 4 years 1935–38. For every person in the lumber industry in 1929 there were from 3.5 to 4 people directly and indirectly relying upon his income. This includes the worker, his family, and those in secondary industries and occupations dependent upon his expenditures. Thus the decline in employment by the lumber industry has affected the welfare of a great many people.

Unless the utilization of the secondary species increases, a further decline in employment by the lumber industry is inevitable. The longer this is postponed the lower it will go. If the other species continue to be utilized only at the present rate, and the western white pine cut is reduced to 140 million board feet, the annual employment will be no more than 3,600 man-years as compared with 6,000. Eventually, however, if the western white pine resource is most effectively managed, the volume of employment can be greatly increased beyond 3,600 man-years, even with adverse markets. If also, by some good fortune, the secondary species become completely marketable, sustainable employment can be higher than the 1935–38 average.

The great economic loss resulting from fire is sometimes not fully appreciated. Were it not for fire, the allowable cut of western white pine could be 26 million board feet (log scale) more than it is. This additional volume would furnish 340 man-years of employment from stump to freight car. Directly and indirectly, it would furnish livelihood, at the 1929 standard, to 1,200 or 1,400 persons. To the forest economy of northern Idaho, these are important figures. The fact that, for every 50 acres of western white pine seedlings and saplings swept by fire, 1 man-year of potential forest employment goes up in smoke, is a matter of no small consideration.

The seriousness of fire loss can be expressed a little differently in terms of dollars. The f. o. b. selling value of western white pine lumber fluctuates around $30 per M board feet (lumber tally). This must cover stumpage, wages, taxes, other expenditures, and profit. Thus, fire in reducing the allowable cut of western white pine timber

[13] Cummings, L. J., and Varney, R. M. western red cedar pole resources in north idaho and northeastern washington. North. Rocky Mountain Forest and Range Expt. Sta. Forest Survey Release No. 16, 36 pp., illus. 1939. [Processed.]

by 32 million board feet, lumber tally, per year (26 million board feet, log scale) reduces the community income by $1,000,000 annually.

The management possibilities of the forest resource in northern Idaho very largely determine the whole forest program. The rather low ceiling of sustainable western white pine production absolutely prohibits maintenance of the lumber industry on its present scale, unless there can be a greater utilization of secondary species.

The allowable cut of 140 million board feet of western white pine represents a fixed ceiling, however, only so long as the factors affecting it are unchanged. While the present overcut of western white pine continues, the allowable cut will tend to go steadily downward. If a large additional area changes from western white pine type to other types following logging, and if the percentage of western white pine in the young stands on cut-over areas is not so heavy as before logging, the allowable cut will tend to go down still farther. If blister rust is permitted to decimate large areas of western white pine, the result will be the same.

On the other hand, the possibilities for increasing the allowable cut through reduction of fire losses have already been emphasized. There is an equal opportunity in the control of insect infestations. Larger yields would result from intensified management practices of the sort exemplified by the Potlatch Company's selective cutting operations in the Clearwater district. Through still more intensified management, it would be possible to decrease the likelihood of insect infestations, to utilize timber which would otherwise be lost through competition, and to increase the utilizable growth.

Once the effects of past overcutting are compensated for, good protection and a higher grade of management practice are required if the allowable cut is to be increased above present levels.

Obviously, overcutting of western white pine can be justified if the secondary species improve sufficiently in value to compensate for it later on. If overcutting of western white pine continues and the hoped-for improvement in the values of the other species does not materialize, northern Idaho must eventually pay the piper in the form of very much lower employment.

Economic Factors

Markets

IT HAS been pointed out that the forest industry will shrink in the future unless the cut of conifers other than western white pine can be increased. This brings forward the question: What is responsible for the present design of production? The markets available to the local producers must be examined to determine the basic causes for the unbalanced production and the possibilities of change.

The Present Situation

In the absence of a better term, northern Idaho may be classed as a resource region. It has raw materials but is thinly populated and therefore has only a limited consuming capacity. The forest industry, to expand to its present size, has developed markets outside the region. Thus, there are two aspects to the market problem—the local consumption and the outside distribution.

Logs for lumber are the principal item of cut by an overwhelming margin, but four-fifths of the lumber is shipped out. Fuel wood is the principal product used at home, accounting for 72 percent of the wood consumption in northern Idaho. The average annual consumption of the various products in northern Idaho is shown in the following tabulation:

Lumber	102 million board feet lumber tally.
Fuel wood	339 thousand cords.
Fence posts	837 thousand pieces.
Mine timbers	2 million linear feet.
Poles	12 thousand pieces.
Piles	78 thousand linear feet.
Hewed ties	16 thousand pieces.
Shingles	29 thousand squares.
House logs	590 thousand board feet log scale.

Since the timber resource is abundant and coal deposits are not, fuel wood is the principal source of heat in northern Idaho. Although cordwood is shipped into Spokane and other points in eastern Washington, 91 percent is burned locally, principally from low-quality timber and dead wood.

In the case of mine timbers, hewed ties, piles, shingles, and house logs, also, local consumption is a high proportion of the production. In fact, more than twice as many shingles are consumed as are produced. Of all these minor products, posts alone show a greater number shipped out than used locally in the period for which the data are compiled. There is little chance of the local markets for these products greatly increasing, or of any substantial outside markets being developed. Consequently, although they are produced entirely from the secondary species (including ponderosa pine), their markets offer little possibility for changing the unbalanced drain.

The pole industry, on the other hand, relies almost completely (95 percent) upon outside markets. It has already been pointed out that the production of redcedar poles is actually greater than is desirable, and that therefore any increase would be unwise.

At the present time it seems that any hope of increasing the utilization of grand fir, hemlock, Douglas-fir, and the other secondary species rests upon the pulp and lumber industries. The only pulp and paper plant in this region is located at Spokane, Wash. Since 1927 this concern has obtained an average of 11.5 million board feet of grand fir, spruce, hemlock, and cottonwood annually from northern Idaho, but this is a trifling amount, for there are approximately 9 billion board feet of these species in the commercial stands. Construction of more pulp plants has so far been discouraged by the competitive market situation, in which the freight rate on pulp and paper is an important factor.

The average annual consumption of lumber in northern Idaho of 102 million board feet, lumber tally, which is about one-fifth of the average production in this area, is as follows:

	Million board feet
Remanufacturing industries	49.8
Railroads	13.1
Farms	13.7
Mining industry	15.8
State and county highways	2.7
Power and communication systems	.1
Federal agencies	1.1
Urban construction	4.4
Municipal governments	.1
Rural nonfarm construction	1.3
Total	102.1

One-half of this total is remanufactured into boxes, sash, doors, match blocks, and other products, largely shipped out of the region. The bulk of the boards and plank used in the remanufacturing plants is western white pine and

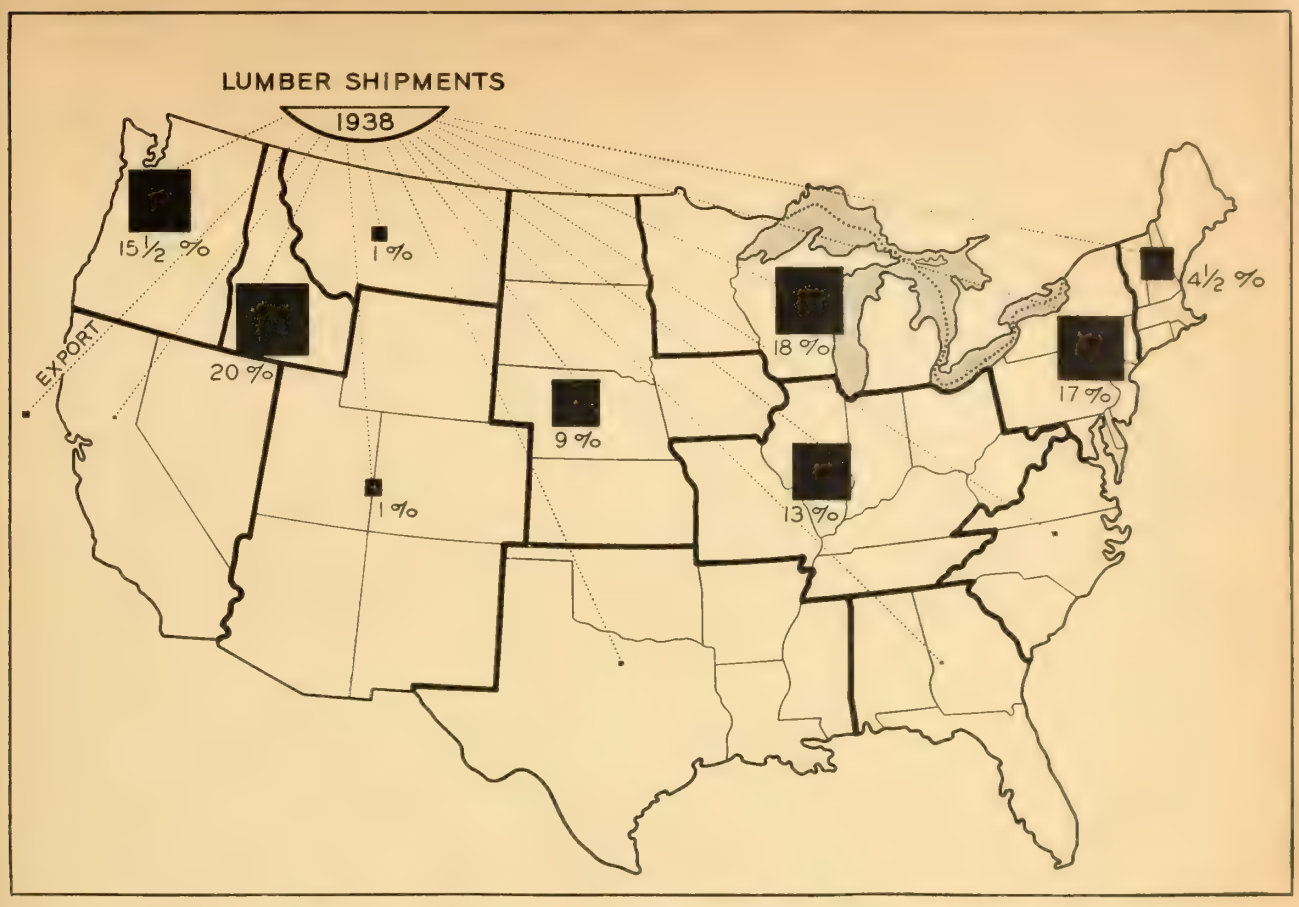


FIGURE 40.—*The original destination of the 1938 lumber shipments from northern Idaho mills.*

ponderosa pine. Since western white pine is being overcut and the allowable cut of ponderosa pine is probably being slightly exceeded by the average logging drain, any expansion of the remanufacturing industries would not help the unbalanced drain situation.

The match block industry represents one of the best markets for western white pine and probably the most stable. This species is considered the perfect wood for matches. Between 80 and 90 million board feet of western white pine plank are sold to the match industry yearly from the western white pine region, which is mainly northern Idaho. The plank is sawed and chopped into small blocks from which the matches are split. Most of this is done in seven block plants in northern Idaho and Spokane, thus giving additional local employment. The blocks are shipped elsewhere to be split into matches. If the match industry is able to fill its needs for plank in this region, it will continue to represent one of the most important outlets for western white pine.

Half of the lumber consumed locally is used in construction, and there is little prospect of material increase in this use.

More than half of the 1938 lumber shipments shown in figure 40 were sent across the country to eastern States. Since rail rates are generally related to distance, the burden of transportation charges has a direct and important influence on the competitive position of northern Idaho in these lumber markets. The average 1938 wholesale price of white pine f. o. b. in the region was approximately $32 per M board feet. On lumber going to the Chicago district, $13.68 was added for freight. To Pittsburgh or New York City, the transportation charges on western white pine were $15.58 per M board feet, one-half of the local f. o. b. price. Since freight tariffs are computed on the basis of weight, the average transportation costs for most of the other species are even greater. Figure 41, comparing the average cost of delivering larch and Douglas-fir from northern Idaho points to Pittsburgh with the average f. o. b. price of these species during 1939, emphasizes the weight of the freight rate in the delivered cost, and therefore its importance as a factor in the competition for the eastern lumber market.

The northern Idaho mills are competing directly with mills in the South which have the advantage of a shorter and cheaper haul to the great consuming market between Chicago and New York. They are also competing with Pacific Coast mills which enjoy the triple advantage of more economical intercoastal shipments, lower [illegible]

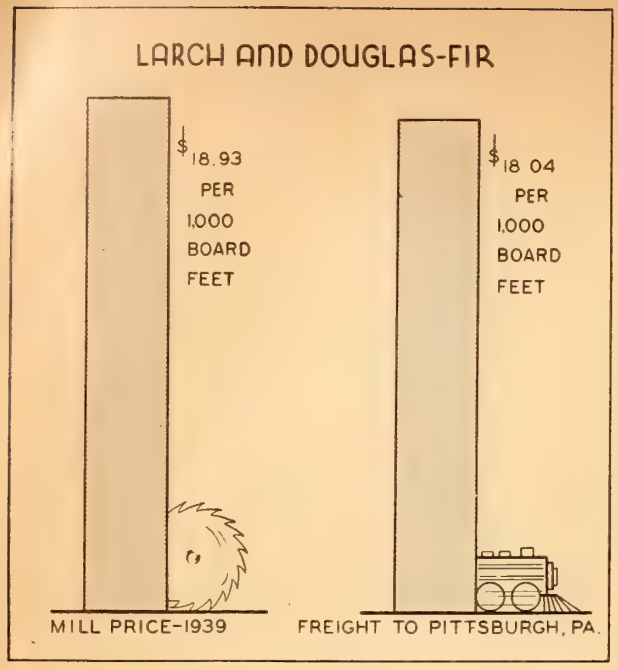


FIGURE 41.—*Comparison of mill price and freight cost shows that the main problem of the secondary species is that, economically speaking, it is too far to market.*

costs, and higher proportion of top-quality lumber in some species.

In marketing western white pine, the handicap of economic isolation is balanced by the fact that it is a quality product that usually commands higher prices than most of the competing species from other regions. This and its virtual monopoly of the match field have enabled producers to expand their production despite this handicap. The demand for ponderosa pine is likewise sufficiently great to enable it to compete in outside markets, but on the whole it is in a less favorable position. Except in isolated instances, the other northern Idaho species, such as larch, Douglas-fir, and white fir, are excluded from the rich eastern market, and even nearer markets. In 1938, northern Idaho supplied only 5 percent of the lumber consumed in Montana, Wyoming, North Dakota, and South Dakota, whereas Washington and Oregon, although farther away, supplied 34 percent. The rate advantage possessed by northern Idaho mills was not sufficient to offset the other advantages which the Pacific Coast plants possess.

The Future Situation

For many years following the expansion of the lumber industry in northern Idaho, the day when the secondary species would improve sufficiently in value to leave a substantial profit margin in their production was a matter of common expectation. This expectation was based on the course of utilization in the older forest regions, but as time went on it faded into a hope which appears today to have less substance than it did 20 years ago. With the natural decline from the boom days, when vast quantities of material were needed to establish new communities, it now appears that the Nation can produce, with reasonably good forest practice, more wood than it is likely to use. As long as this is true, there is every reason to expect that the unutilized surpluses will be concentrated in the economically more remote regions, except where the products of these regions have premium values.

Indeed, it is to be expected that even western white pine will in the future experience greater rather than less competition in the eastern markets with lumber from other forest regions. At present about 10 percent of the western white pine lumber cut in the Spokane territory is of the select grades, of higher value and better able to hold its markets, but the bulk of the timber being logged at present is older and larger than can be raised in a 120-year growing period. Thus the percentage of selects will decline, reducing the average value of the lumber and therefore its ability to compete. That this prospect is not particularly disturbing is due to the fact that the growth capacity of northern Idaho is not sufficient to supply continuously the western white pine market available at present.

The wholesale price of forest products at the point of consumption has two component parts, the cost of production and the cost of transportation. Reducing either or both of these for any one region increases the competitive advantage of that producing center and brings it economically closer to the markets. Although most of the lumber production in northern Idaho is from large sawmills which are for the most part gradually increasing their efficiency, it is questionable how much further costs can be reduced. Cheap lumber is produced by small mills. But since a large part of the savings in small-mill operation is made at the expense of the workingman, a shift to a small mill set-up, unless this condition is changed, would hardly be desirable as a means of producing lumber at a lower cost.

The railroad freight-rate structure has developed in a haphazard fashion, and it has been pointed out repeatedly that scientific justification is lacking for many rate situations. By setting a higher rate from point B to point A than from point C to point A, the economic development of C can be speeded and that of B retarded. Yet it may be desirable from the standpoint of wise use of natural resources that both localities be developed to the same degree. In many instances the freight rate is the key to utilization of the forest resource; yet it is safe to say that the national interest in such proper utilization has not been adequately represented at the freight-rate hearings. At present, there is insufficient basis for determining whether it is to the national interest to expand the utilization of northern Idaho's secondary species at the expense of some other region by reduction of freight rates.

As this is written, the emergency of this country's war

effort has brought about a change in the situation. Prices of the less-used species have improved. It is impossible to tell now to what extent the cut of these species will increase as a consequence. However, with the passing of the temporary stimulus there seems to be no present reason why such gains as do occur will not be largely lost, unless in the meanwhile some fundamental change can be made in the competitive position of these species.

Forest Taxation

Because the benefits of government cannot be furnished without cost, it is reasonable to expect forest land to contribute, along with other real property, an equitable share of the tax revenue required.

Many people consider taxes to be the nub of the forest problem. One cannot brush away the other factors, such as the fire situation and the general attitude of the lumber industry, and say that the property tax has been responsible to this or that degree for the excessive liquidation in the past. Nor can he say with any positiveness that a relatively heavy tax is unjustified where the private operator is bent upon liquidating his holdings with all possible speed. Nevertheless, the operation of forest taxation unquestionably places private ownership of forest land at a serious disadvantage, amounting to discrimination against the forest owner in comparison with other property owners.

This situation has its roots in two factors. The assessed values of forest land tend to be high in relation to actual value based on income-earning capacity. Also, acre for acre, timber produces revenues only periodically. A third item of importance enters where the cost of local government is heavier than the tax base can bear without unusual hardship—a factor which affects all property holders alike and represents no discrimination against the forest owner. While it is likely that economies in most local governments could be realized without restricting the quality of their services, no authoritative analysis has been made of this phase of the problem in northern Idaho.

Studies by the Forest Service [14] have shown that, for the Nation as a whole, the tax load on lands held for timber production is generally greater than the tax burden on other classes of property. The ratio between property taxes and realized income for forestry enterprises that must start with cut-over land usually amounts to 50 percent or more. In contrast, the ratio between property taxes and realized income for all United States corporations was only 11 percent about 1930.

The property tax operates to extract a steady annual income from the landowner, a system suited to a forest property returning a continuous flow of revenue. But for the person owning largely cut-over land, which will not reach the revenue-producing stage for a long time, the outlay for taxes in the interval before cutting frequently represents a discouraging if not impossible burden.

In 1929, the Idaho Reforestation Law was passed to meet this second basic cause of the tax problem. This law delays most of the tax burden on young forest stands until such time as the timber is cut, thus reducing the investment required to hold timber. Lands classified under the provisions of the reforestation law are assessed at $1 per acre up to the time of logging, unless the property also has some value for other purposes such as grazing. In lieu of the additional taxes, which would otherwise be collected year by year, a yield tax of 12.5 percent of full current stumpage price is levied upon the material cut, at the time of logging. One major limitation is that no forest land now bearing commercial stands may come under the provisions of this act until after these stands are logged. The term "commercial" in this case is limited largely to the timber of salable species and quality which is of merchantable size.

At a very rough estimate, there are probably 2 million acres of privately owned forest land in northern Idaho eligible under the provisions of the reforestation law. A total of only 11,000 acres bore this classification in 1938, indicating that the law has not justified the high hopes held for it at the time of enactment.

Whatever secondary explanations there may be for this lack of response, two major underlying causes for the situation are apparent. The reforestation law does not relieve the pressure where it is greatest. The heaviest tax burden upon the private operator results from his merchantable timber. Also even with a minimum tax burden, the carrying charge represented by fire-protection costs, the still great risk of fire loss, and in many cases the long period before revenues can be realized, tend to make the investment-wise uninterested in permanent forestry.

In passing, the Idaho sustained-yield-districts law of 1937 should be mentioned. Among its other features this law provides for the exemption from taxes of young growth and seed trees left for conservation purposes within sustained-yield districts. To date, however, this law has been completely inoperative.

There is nothing scientific in the extraction of taxes from the forest owner in northern Idaho. In the first place the tax rates are far from uniform. From county to county the average rates differ, but an even wider range of rates exists between the school districts and road districts within the counties. A complete compilation of the tax rates on forest land has never been made. However, on 109 scattered parcels comprising 43,000 acres, the average rate was approximately 34 mills or 3.4 cents per dollar of assessed value. There is also little uniformity among the counties in the basis for establishing land values. Each has its own individual system, making comparisons difficult. In table 7 the average assessed

[14] FAIRCHILD, F. R., and associates. FOREST TAXATION IN THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 218, 681 pp., illus. 1935.

valuations for several classes of land are shown for northern Idaho as a whole and also the tax per acre, assuming that 34 mills is the average tax rate in every case.

Since the forest owner interested in permanent management can classify his young stands under the reforestation law, the higher tax for cut-over and burned land and grazing land shown in table 7 is not of importance. But the tax on merchantable timber of salable species cannot be side-stepped or postponed, as such timber is not eligible under the reforestation law. For a sample of 111 million board feet of western white pine in several counties, the 1936 tax on land and timber combined was 8 cents per thousand board feet of western white pine. Davis has used an average tax of 5 cents per thousand board feet of western white pine in his calculations.[15] Even at this lower figure, one-tenth or one-eleventh of the stumpage value is consumed by taxes every decade that merchantable timber is held.

TABLE 7.—*Average assessed valuation in northern Idaho per acre and assumed average tax per acre at 34 mills, 1938*

Class of land	Value per acre [1]	Tax per acre
	Dollars	*Dollars*
Timber land (including timber)	10.12	0.344
Cut-over and burned land	2.74	.093
Reforestation land	1.00	.034
Waste land	.62	.021
Grazing land	2.59	.088

[1] IDAHO STATE BOARD OF EQUALIZATION PROCEEDINGS, 1938.

The weight of taxes on a forest owner depends largely on the nature of his holdings. For example, assume that an owner operating upon a 120-year rotation has 120 acres of western white pine forest, 60 acres containing merchantable timber with 12 M board feet of western white pine per acre, and the other 60 acres bearing younger stands in two or three age groups. If he plans on operating permanently, the 60 acres of younger stands would be classified under the reforestation law, but the 60 acres of mature timber would be taxed as in the past, possibly at 5 cents annually for each thousand board feet of western white pine. As each acre which is now bearing merchantable timber is logged, that acre could be classified under the reforestation law.

In the very first year he would have a tax bill of $38.04. If western white pine stumpage were $6 per thousand board feet and if he logged 1 acre yearly, the tax would be more than half of the gross return of $72. In the sixtieth year his taxes would be $4.65, but during these six decades the average annual tax would have been $21.34 or 30 percent of the average annual return. In the sixty-first year the first yield tax would be paid, and from then on the tax collector would receive $13.08 annually. Since it does not immediately relieve the pressure to liquidate merchantable timber, the reforestation law does nothing to encourage sustained yield by the most important private forest owner—the man who has the timber resource and is in a position to set in motion a stable forest enterprise that produces revenue from the start.

As has already been mentioned, the reforestation law does not make permanent forestry very tempting even to the owner with only young stands to his credit. Since taxes cannot be charged off as an operating cost when there is no operation, each tax dollar on immature forest represents an investment entitled to draw interest. A 20-year-old sapling stand which will in another 100 years yield 12 M board feet of western white pine will by that time have acquired a tax investment under the reforestation law of $20.65 an acre. An interest rate of 3 percent is used in this calculation, which is rather low considering the fire risk. At the time of cutting, a yield tax of $9 will be levied on the basis of $6 stumpage, and the total tax investment will have amounted to 41 percent of the stumpage value.

The Economics of Private Forest Ownership

To the lumbermen coming into northern Idaho at the beginning of the century, the virgin timber resources must have appeared as a vast store of wealth awaiting conversion into legal tender. Fresh from their successes in the Lake States, with the shadow of a widely heralded national timber famine sending stumpage prices continuously upward, they must have envisioned the forests of northern Idaho as an ideal field for private enterprise. The timber famine, however, failed to materialize, and stumpage prices did not continue to improve rapidly enough to keep ahead of the steady piling up of carrying charges. Instead of being able to sit back and watch their investments multiply in value, they found themselves saddled with a white elephant of ever-increasing costs and diminishing profits. For many of these owners accelerated lumber manufacturing became the means of getting out of a bad situation.

As early as 1913, it is said, a scattered few began to recognize the nature of their dilemma and wonder whether the lumber industry might have been better off if the Government had held on to its forest land but sold the timber currently to those wishing to engage in lumber manufacturing. The quarter of a century since 1913 has seen a general recognition of the fact that the field for private forestry has very definite limitations. It is a question today how much farther private ownership will have to retreat, as it is obvious that, once logged, a great share of the present private forest area will inevitably drift back into one form or another of public ownership.

Except for farm forests, the hope for permanent private ownership lies principally in those areas with sufficient

[15] DAVIS, K. P. ECONOMIC MANAGEMENT OF WESTERN WHITE PINE FORESTS. U. S. Dept. Agr. Tech. Bul. 830, 77 pp., illus. 1942.

merchantable timber to permit the establishment of a sustained forest business. Only in the Clearwater district (Latah and Clearwater Counties) is this possible on a district-wide basis, the liquidation having proceeded too far elsewhere.

The Owner With Cut-Over Forest Land

In considering the question of forest ownership the individual will ask himself two questions: "How much will my investment return?" and "How long must I wait for it?" In other words, will the revenue produced at the end of the rotation yield a profit over taxes and protection costs when these are carried forward at even a low rate of interest? Will the owner be able to retain possession of the stands for the long period which must elapse before the young stand will produce revenue? He may find a favorable answer to these questions in the possibility of one or more partial cuttings designed to bring quicker and more frequent returns as well as increase the total income.

Another class of private purchaser is the one who buys partially grown western white pine for immediate operation. In certain areas stands 60 to 70 years old are being bought cheaply on tax title, because at this age a few of the faster-growing trees have reached sawlog size. Generally all salable timber is soon removed. This practice has proved more or less profitable to the individual, but it will ordinarily result in a long-run loss to the community, as this timber is being liquidated at the beginning of the period when the maximum saw-timber growth takes place.

It should be remembered that the present opportunity for investment in immature western white pine stands is relatively limited. Extensive areas of young stands do not contain western white pine; from these there is no present prospect of revenue. Secondly, there is a shortage of the 61-to-80-year age class. As the forest-land seekers at the beginning of the century were interested only in saw timber, 64 percent of the present western white pine stand 61–80 years of age is owned by the State, County, and Federal Governments. That there is even 36 percent of the area of this age class in private lands is largely because the Northern Pacific land grant was made in alternate sections rather than with regard to stand quality.

The Owner with Sufficient Saw Timber for Sustained Production

The effect of taxes upon the forest owner has been discussed. In the following examples the other costs are added to the taxes to complete the picture.

In a very complete analysis of the financial aspects of growing timber in the western white pine type in northern Idaho, Davis [16] has calculated fire-control expenditures, taxes, and other costs on a realistic basis for a hypothetical forest property. One item of expense is his charge for the stand improvement essential to permanent operation on a western white pine basis. The present western white pine stands were principally established following fires which removed the competition of other species. To establish comparable stands after logging, it is usually necessary to open up the relatively dense canopy of the secondary species generally found in mixture with the mature western white pine.

Davis has examined two systems of management. One, which he has called the 1-cut system, consists of cutting each acre every 130 years. The other, termed the 4-cut plan, involves four cuttings on each acre during the rotation—at 90, 110, 130, and 150 years. The 4-cut plan is actually on a 130-year rotation also, as the cut at 150 years consists of a few scattered trees left to acquire greater diameter and assure a seed source. At the time these trees are cut the timber of the next rotation growing underneath will be 20 years old.

Financial calculations for each system were made under two assumptions: (1) That western white pine alone will be salable. The values were then recalculated (2) on the basis of the secondary species yielding an additional but small stumpage return. For present purposes the gross annual return in each case as calculated by Davis has been reduced by 6 percent to allow for fire losses, and it has been assumed that the Federal Government will bear the blister rust control cost, as will probably be the case. The following tabulation shows the present value of the property per loggable acre in each case, or the present value of all future net incomes discounted at 3 percent:

Utilizing western white pine only:	
One-cut plan	$8.53
Four-cut plan	17.83
Utilizing all species:	
One-cut plan	13.97
Four-cut plan	24.33

These figures indicate that it is possible to increase materially the value of the property by partial logging. The total cut of western white pine from each acre over the rotation is under the 4-cut plan 36 M board feet, but only 24 M feet under a 1-cut system.

When dollars are the main consideration, however, even the 4-cut plan cannot compete with a quick liquidation. If the owner were to liquidate the pine alone over a 10-year period and let the residue go back to the county, present value of the property would be some 70 percent greater than under the 4-cut plan cutting all species. The present value of all species in this case would be $41.66 per loggable acre. Liquidation is not the best forestry—certainly not the best for the community—but who can say it is not the best financial arrangement for the present owner, excluding, of course, any social responsibility which may devolve on him or any desire he may have to stay in the timber business.

[16] See footnote 15.

Too much emphasis is sometimes put on taxes and protection costs as the causes for liquidation of private holdings. Actually the most important contributing factor is probably the fact that 1 dollar a quarter of a century hence is worth only 48 cents today at an interest rate of 3 percent. The fire-protection and tax burdens might be considerably lightened in certain instances without materially increasing the attractivemess of permanent private forestry. This can be shown by following through what may be regarded as a typical case in northern Idaho. For simplicity, an area of 200 acres has been chosen in the following assumed situation. In actual practice the management unit would probably be 100 or 1,000 times as large. The assumptions as to yields, revenues, and expenses are as follows:

The property:	
Total acreage.....acres.	200
Stands of secondary species (nonrevenue producing)...do.	80
Young western white pine stands, 1 to 80 years old....do.	70
Western white pine saw-timber stands 120 years and older.....acres.	50
Volume per acre of western white pine in these saw-timber stands.....M board feet.	12
Total annual cut of western white pine for sustained yield (120-year rotation) before reducing for fire losses.....M board feet.	12
Revenue:	
Case No. 1: Value of western white pine stumpage per M board feet	$5
Total revenue ($60) minus 6 percent for fire losses.....	$56.40
Case No. 2: Value of western white pine stumpage per M board feet.....	$7
Total revenue ($84) minus 6 percent for fire losses.....	$79
Expenses:	
Taxes per M board feet of western white pine saw timber .	$0.05
Taxes per acre under reforestation law (applied to all area except western white pine saw-timber stands).....	$0.034
Yield tax when young stands classified under reforestation law are logged.....percent.	12½
Fire-control costs per acre.....	$0.10
Administration costs per acre.....	$0.01
Stand-improvement costs per M board feet of western white pine cut.....	$1

In this case it will be noted that the yield of western white pine is much lower than in the Davis examples. A yield of 12 M board feet of western white pine per acre is, however, much nearer average for northern Idaho on the basis of the Forest-Survey standards. For the purpose of comparison, calculations were made on the assumptions that the western white pine could be sold (1) for $5 per M board feet and (2) for $7.

The first calculation is founded on the following conditions—sustained-yield operation; a 120-year rotation; a 1-cut plan (logging each acre once every 120 years); the present system of taxation; and no relief from the burden of fire costs. Costs and revenues would be constant except for taxes. The owner would very likely classify all of his area not containing western white pine saw timber under the reforestation law. As quickly as the present saw-timber land is logged, it would be classified also. Thus, the taxes would steadily decline during the first 50-year period, advance in the fifty-first year when the first yield tax is paid, and remain at that level thereafter. If the anticipated net returns in this case are discounted to the present at 3 percent interest, the present values per loggable acre are:

$5 stumpage.....	$0.07
$7 stumpage.....	6.17

It has been pointed out that the reforestation law fails to meet the real tax problem in that it does not relieve the pressure of liquidation on the timber which is now merchantable. Since no detailed analysis has been made of the tax situation in Idaho, it is impossible to say what modifications of existing procedure will best serve the purpose of relieving this pressure.[17] If, however, this situation were met by modifying the reforestation law to include all saw-timber stands cut on a sustained-yield basis, the burden of taxes would be lightened and the value of the property so increased that the present values per loggable acre would be:

$5 stumpage.....	$2.40
$7 stumpage.....	7.90

So far in these two cases, it has been assumed that the Federal Government will continue to carry the blister rust costs. If, in addition to the taxes being modified, the job of fire protection were to be taken over by governmental agencies, the present values of the property per loggable acre would rise still higher because of the greater earning capacity, amounting to:

$5 stumpage.....	$7.90
$7 stumpage.....	13.40

Thus, if the Government assumed the cost of fire protection, and the flat tax on timber were eliminated by altering the tax structure, the attractiveness of sustained yield would be increased for the private operator. But the owner of such a property would naturally ask, "What will my forest land bring if I cut it over during the next 10 years and forget about sustained yield?" He would find that even with no government help in fire protection and no reduction in taxes, liquidation over a 10-year period would be the best proposition on purely financial grounds, since it would raise the present value per loggable acre to:

$5 stumpage.....	$18.00
$7 stumpage.....	26.50

The comparison on the basis of $7 stumpage may be summarized as follows:

Sustained yield, present taxes and fire costs.....	$6.17
Sustained yield, present fire costs, taxes reduced.....	7.90
Sustained yield, government fire protection, taxes reduced.....	13.40
Liquidation in 10 years, present taxes and fire costs.....	26.50

[17] Several practicable means of eliminating the excess burden of taxation on deferred-yield forest properties have been proposed in Forest Taxation in the United States. (See footnote 14.)

Another factor tending to discourage sustained yield is that most of the sawmills are large—too large in the aggregate for the present productive capacity of the forest. The investment in these mills is in proportion to their size. Thus, the necessity for a large production of lumber to support the heavy depreciation charges has been and to a certain extent still is one of the causes for overcutting the resource.

What conclusions can be drawn regarding private forestry in northern Idaho? There are several.

(1) It appears that liquidation is hard to beat on financial grounds for a property containing much merchantable timber. To maintain a continuous production, the operator would be obliged, because of the lengthy rotation, to spread his present saw timber over too long a period.

(2) While taxes and fire-protection costs fall far short of being make-or-break factors between sustained-yield forestry and liquidation, they are important.

(3) There is probably an inherent desire on the part of most lumbermen to stay in business as long as they can.

(4) Since in the long run the public rather than the lumber industry is the principal gainer from sustained-yield forestry, every effort should be made to whittle down the margin between liquidation and sustained yield to the point where the private operator can see his way to stay in business. Equitable taxation and increased public aid for fire protection to the individual wishing to engage in permanent forestry are both proper steps in this direction.

(5) Conditions undoubtedly exist wherein the gap between liquidation and sustained-yield forestry is not so wide. For example, suppose a mill operator owned part of the timber in a particular management unit and the public owned the rest. He might find it to his advantage to embark on sustained-yield management if he could be assured that a certain volume of public timber would be available for his mill. It is to be expected that there will be increasing opportunity for cooperation of this sort in the future.

(6) More intensified management offers another means of reducing the trend to liquidation. The advantages of partial cutting are very marked in the case developed by Davis. It should be remembered, however, that in this example the yields are about as high as may be found over an extensive area. Moreover, the forest was assumed to be in a regulated condition; that is, the species composition and the size and age of timber were such as would be found after many years of management. The current margin between the 1-cut and 4-cut systems would probably be much less for a person starting with a wild forest.

In view of all this, it can be said that probably a very large part of the remaining private merchantable saw-log timber will be liquidated; that all of the possibilities for promoting private sustained-yield forestry have not been fully exploited; that the best opportunities for permanent private forestry are in areas with a fairly heavy volume of western white pine per acre.

Government Participation Necessary

If the markets for the forest products of northern Idaho were to evaporate suddenly, private forest ownership and responsibilities would for the most part cease just as quickly. The individual is concerned primarily with making a living. But, revenues or no revenues, the public's responsibility for the condition of the forest cannot be ignored. The government must continue to protect the enormous assets in wooded watersheds and recreational facilities, though the costs be heavy. Principally, this is a matter of fire protection. Although it is difficult to measure the complete value of green stands, few will deny the reality of the public obligation to keep the forests green.

Shall the public obligation be considered, however, to go beyond the minimum expenditure necessary to keep the forest green and to include the spending of additional money for the purpose of improving its financial productivity? For example, not a few have questioned the wisdom of the Federal Government's engaging in blister rust control activities. Unlike fire protection, blister rust control can be justified only if the social and economic returns from western white pine timber utilization exceed the cost of protecting this timber from disease.

It is evident from the preceding financial calculations that the private forest owner could not carry blister rust control costs in addition to his other expenses. Money now spent by him in the control of this disease represents an investment locked in growing stands for probably 50 years or more—an investment which must return itself, plus a reasonable rate of interest. Government investments on the other hand, may be judged not only by the tangible direct returns but also by the indirect and largely intangible returns in the form of greater opportunities for the members of society as individuals. If the judgment of the pathologists is sound in its essentials, and this must be assumed, it is a choice between blister rust control with a permanent white pine industry, or no blister rust control and some day no white pine industry. The comparison is, therefore, more than one of control costs against eventual stumpage returns. The loss of wages and employment, plus the social losses in disrupted communities, must be considered.

Because of unknown factors which must be dealt with arbitrarily, the making of financial calculations which reach far into the future involves the risk of later appearing ridiculous. Yet, no sound action program can be laid out without attempting to evaluate future results. Recognizing these limitations, it will be shown that the actual

outlay for blister rust control on the national forests will probably be returned (without interest) to the Government through the sale of western white pine stumpage. Because of the broad social and economic purpose behind public investment as compared with private investment, money interest is omitted in analyzing blister rust costs. The social benefit accruing to industrial communities in the form of increased stability is assumed to represent the interest on the public investment.

At the time of the first attack upon the blister rust problem, it was estimated that control could be achieved at a cost of $2.50 per acre of western white pine land. This might possibly have been sufficient, if funds had been available to pursue the control work on the scale recommended and to complete the project by 1935. Because of delay, which has allowed the disease to become firmly entrenched, and because of several other factors growing out of this, it is estimated a total of about $8 per acre must be spent before the control will be on a maintenance basis. However, the entire program can still be justified on financial grounds.

It was pointed out in the chapter on blister rust that if no attempt had been made to control this disease, the losses would range from disastrously complete in young stands to only partial loss in merchantable western white pine timber. For the purpose of calculation, it is assumed that, unless controlled, the disease will eventually take a toll equivalent to complete loss of all western white pine stands under 60 years of age. Many pathologists will consider this a very conservative supposition.

It is reasonable to weigh the value of the timber saved against the cost of saving it. Therefore, it is proposed to charge against the stands 1 to 60 years of age all the original outlay plus the later annual expenditure required to protect this investment during the first rotation. The money needed for maintenance following the original outlay has already been estimated at 10 cents an acre. But since 9½ cents, principally spent for reworking cut-over and burned-over areas, is chargeable to the following rotation, maintenance will not rest very heavily upon the crops to be cut in the first 120-year period.

On the basis of the assumed losses and estimated total costs, a favorable case can be made for blister rust control on the national forests. Two situations will be compared: (1) The net annual revenues in 60 years if no blister rust control has been done; (2) the net annual revenues in 60 years if the program recommended by the Forest Service and the Division of Plant Disease Control of the Bureau of Plant Industry is completed on schedule.

The annual cost of administering the national-forest land in northern Idaho is 27 cents an acre, not including blister rust control. In round numbers this amounts to $1,800,000 yearly for the whole national-forest area. With no blister rust control program, the western white pine revenues would in another 60 years be negligible. The income from other sources, assuming a very limited market for species other than western white pine, might amount to $75,000 yearly. With an income of this size the financial situation in 1999 and thereafter would be thus:

Annual operating charges	$1,800,000
Annual western white pine revenues (negligible)	.....
Annual revenues (other sources)	75,000
Net cost	1,725,000

This $1,725,000 would represent the net cost of protecting and managing the watersheds, the remaining low-value timber, and the recreational assets.

If the Government continues to fight blister rust on national-forest lands, the revenues will be greater, but so also will be the expenses. If the present outlay to protect the western white pine of the first rotation is charged in 60 installments beginning 60 years from now,[18] and if the annual production of western white pine is 70 million board feet, salable at $6 per M board feet the net annual cost of administering the national forests in this period will be nearly $200,000 less, as shown in the following tabulation:

Annual operating charges:	
Fire and administration	$1,800,000
Blister rust	170,000
Stand improvement	70,000
Total	2,040,000
Annual revenues:	
Western white pine	420,000
Other sources	75,000
Total	495,000
Net cost	1,545,000

The allowable cut at that time will obviously depend upon the extent of annual fire losses and other factors. A yield of 70 million board feet was calculated as a reasonable national-forest production on the basis of several purely arbitrary assumptions. By engaging in blister rust control, the Federal Government will reduce to $1,500,000 annually instead of $1,700,000 the cost of protecting the watershed, timber, and recreational values of national-forest land.[19] But what is far more important locally is that a 70-million

[18] Actually, it might not be quite equitable to charge all of the original control work against the first rotation, since the yields of western white pine in the following rotations are also being safeguarded. It is worth noting, also, that the western white pine saved in the first rotation would be sufficiently valuable to cover the cost of blister rust control in that period, including the expenditures in reworking cut-over and burned-over areas.

[19] If in 60 years the secondary species were to achieve greater value the figures in these calculations would change, but the margin would be in the same direction.

board-foot production of western white pine would furnish to the community in the neighborhood of $2,000,000 yearly in wages, salaries, and other values added through manufacture. The value of public blister rust control is equally great on private lands because of the industrial values at stake. Thus, the blister rust control program would seem to offer a means of supporting in northern Idaho a much higher economic standard than would be possible without control, and at a lower end cost.

Which Government?

As private lands stripped of their convertible wealth drift back into public ownership, they may become permanently the property of the counties, the State of Idaho, or the Federal Government. Which of these becomes the ultimate owner should be determined by the willingness and ability of these agencies to maintain the lands in a productive condition.

For the counties faced with a pressing problem of financing, it is simply out of the question to carry cut-over forest land for the long period until an income will be produced.

At present, the State does not maintain an organization adequate to administer the extensive forest resources which it already owns. This sentiment is expressed by the State forester in the Twenty-Fourth Biennial Report of the State Land Department of the State of Idaho, 1937–38. It is a curious fact that, although sustained-yield management by private timber operators has been a public objective for many years, the State itself, owning between one-fifth and one-sixth of the remaining western white pine timber, does not as yet operate under a sustained-yield plan. In spite of all this, it would seem desirable, for a number of reasons, to have the State assume the responsibility for managing at least part of the forest land which will pass out of private ownership; but first, the State forestry organization should be adequately financed and manned for the job.

By default, the major part of the public forest-land problem has so far fallen on the shoulders of the Federal Government. At the present time, in the national forests, it protects and administers the bulk of the noncommercial forest land in northern Idaho. It, alone, is fully geared to meet the conservation problem on the land it manages, and has the facilities, the manpower, and the will to do it.

A very large share of the lands likely to come into public ownership in the future will produce for many years a net operating deficit or low net profit. This will tend to make Federal ownership the most attractive to the local communities. The Federal Government must thus bear the burden of protection and in addition return 25 percent of what gross receipts there may be to the counties for roads and schools; and use another 10 percent for national-forest road and trail construction and maintenance.

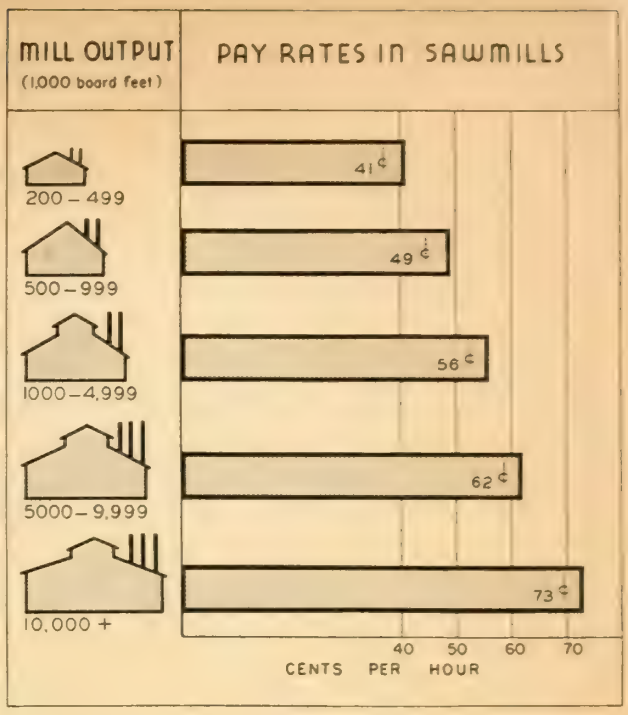


FIGURE 42.—*Average hourly wage and salary rates in sawmills of the northern Idaho region, classified by volume of cut in 1939.*

What Kind of Industry?

Not much thought has been given to the kind of forest industry that northern Idaho should have. In view of the extensive acreage of State and national forests, the public may have a considerable influence on the nature of the future forest industry. The matter of sawmill size is especially important and deserves thought. If the Forest Service and State forester's office were given administrative discretion, they could exert a strong influence on the size of the sawmills that continue in operation and those built in the future. For example, suppose there were two sawmills in a given area, both dependent upon State timber, and one of them had twice the capacity of the other. If there were insufficient timber for both mills the State administrator, in deciding for the greatest public good which should receive the timber, would inevitably determine what size of plant should continue in operation.

A balanced forest industry will certainly require that there be all sizes of sawmills from the very small to the relatively large. In many instances the question will arise, however, "Should there be one larger sawmill in this unit or several smaller ones?" This question should be answered by determining which kind of establishment returns the most to the community. In this connection it is interesting to compare (fig. 42) the average hourly wage rates for sawmills of several size groups in the region. It will be noted that sawmills producing one-fifth to one-half million board feet annually had an average hourly

rate of 41 cents, and the average hourly scale grades upward according to size to 73 cents for those concerns producing 10 million board feet or more. This is probably a combination of better pay for comparable jobs and a greater proportion of more highly skilled positions in the larger mills. At any rate it is a strong talking point for the medium- or large-size mill. Other arguments for larger mills are that they do superior processing on the average, have better distributing facilities, and are more stable. There is no basis for setting an arbitrary point and claiming that mills above this size are desirable and those below not, for the reason that this comparison is built on averages. A few small sawmills, for example, pay wages comparing favorably with the average of larger plants. There are certain advantages to small mills. For example, the small mill is more adaptable to conditions where the timber is small and scattered. Also some of the present faults of these mills can be remedied.

Much investigation will be necessary before the question of size can be answered with any degree of finality. Certainly because of the relatively small sustainable output, there is an upper limit in size. Improvement of the less satisfactory milling practices and wage standards in the small plants is possible. At present, however, it would appear desirable to favor in general the mills producing at least 5 million board feet annually.

An Action Program

THE picture that has been drawn thus far can hardly be called satisfactory. It portrays a lopsided timber industry and forest economy under which western white pine serves as the major prop despite the fact that there is a vast resource of other timber. And all the time this prop is being whittled away at a very disturbing rate. Tomorrow's economic security for the region is being sacrificed to today's demands.

Overcutting of western white pine and undercutting of other species is but the more immediate aspect of the situation. Much of the commercial forest land in northern Idaho is now privately owned, but, as the saw-timber resource is dwindling, the field for private forest enterprise is shrinking also. Permanent private forest operations may be possible on some of the area not in farms, but for the greater acreage the outlook for private industrial forestry is discouraging.

Northern Idaho has a forest-fire problem which is no less than appalling, a situation which threatens watershed and recreational as well as industrial values. It is faced with a blister rust menace which, unless adequate control efforts are continued, promises eventually to exterminate the western white pine industry. To combat fire and blister rust effectively is a costly task, and to keep these activities in proportion to the values involved is a problem in itself.

The unbalanced drain upon the forests, the economic burdens oppressing the private owner, the size and cost of the protection job—these are three formidable problems. They must be successfully solved one way or another if the forest industry is to be stabilized at the highest possible level. Confusion is added to the scene by the fact that the public, as represented by local, State, and Federal Governments, has not come to an agreement with itself concerning the problem, the approach, and the division of responsibility.

That the timber supply of tomorrow will be reduced unless proper measures are taken is not the most important element of the situation. What counts more heavily is that a reduced industry means less employment, a lower standard of living, and more discontent—a termite attack on the underpinnings of our democracy.

Economic conditions which form the setting for the forest problem will certainly be different in 10, 20, or 30 years. Unfortunately, these developments cannot be anticipated. It is possible that the changes may be sufficient to alter the outlook completely. This immediately leads to the hope—and it is only a hope—that the markets may eventually absorb the secondary species, enabling a utilization up to the full productive capacity of the forest. Since the ultimate goal is community stabilization, and since a western white pine industry will support a much smaller community than an all-species industry, common sense dictates that the action program be directed along two broad lines: The house must first be set in order on the basis of present conditions; that is, bring the western white pine drain into line with productive capacity and thereafter maintain a western white pine industry at the highest sustainable level. Then strive for a larger permanent total industry by seeking to increase the use of the secondary species. With an approach along these lines, hope will not usurp the place of reason.

There is no shortage of solutions. The problem is to select the one which least disrupts the existing scheme of things and which, therefore, invites the public support necessary to transform it into an action program. Also it is necessary to recognize that the course which is best from a purely local standpoint may not serve best the national interest. Therefore, any Federal participation in the program should be conditioned by the national viewpoint.

The Bases for Action

The possibilities for increasing the markets for secondary species have already been pointed out. Private industry and the public agencies need to expand their efforts to find new markets for old products and new products for old markets. In the South, for example, the entire forest economy has been transformed by the development of a paper industry dependent upon the southern pines.

There is need also to reexamine the empirical freight-rate structure from the angle of national expediency, to determine its effect in freezing the uneven utilization of national resources and to see what adjustment is possible that would increase the markets for northern Idaho products.

Reckoning without the possibility of better markets for secondary species and within the limitations set by present economic conditions, two equally important considerations are involved in any action program. One is the need for checking the runaway liquidation of western white pine and the other is the immediate necessity of laying foundations for a stable forest economy by providing adequate forest protection and by effecting those additional changes which will make possible sustained-yield management for all forest land.

Applying the Brakes to Liquidation

To face the issue squarely, the private operator, owning 45 percent of the western white pine saw timber, can hardly be expected to exercise the restraint essential to the conduct of a permanent timber business, unless the margin between the returns from sustained-yield forestry and the profits from a "mining" enterprise is greatly reduced. The present rate of liquidation is in itself evidence that sustained-yield forestry is not an attractive proposition, and the calculations in the preceding chapter confirm this evidence.

There are very definite practical considerations limiting what can be done to solve the problem of private forestry in northern Idaho. To stop the overcutting of privately owned western white pine would require either a great sacrifice by the operator or substantial government subsidy. One is too much to demand and the other, since the cost would probably have to be borne by the Federal Government, too much to expect. Liquidation of western white pine on most private lands will probably run its course. Public effort should be expended, however, to decelerate its progress. The most economical way to apply the brakes to exploitation would doubtless be to improve the outlook for private sustained-yield forestry in any way possible. This course is desirable primarily because it has the effect of perpetuating as fully as possible private enterprise, upon which our democratic society is founded. Its promise is in the fact that the present gloomy outlook is conditioned largely by economic factors that are capable of improvement. It will, however, require a considerable amount of public cooperation.

With respect to public forests, free from constant entanglements of private equities, there can be no doubt concerning the proper policy. Fifty-four percent of the western white pine saw timber in northern Idaho is either owned by the State or is in the national forests. Properly handled, this timber will form a buffer which the eastern forest regions did not have—to prevent the liquidation of private timber from eliminating the western white pine industry; to cushion the effect of this liquidation upon the communities.

Four decades of public pressure for conservation might be expected to yield 100 percent administration of public forests on a sustained-yield basis; yet in northern Idaho management of the State forests has never attained this level, and even national-forest policies have not kept pace in all respects with the development of the western white pine situation.

The 18 percent (1.8 billion board feet) of the remaining western white pine saw timber owned by the State, including some of the finest stands in northern Idaho, is not being utilized according to any program of sustained yield. Despite the protestations of those State officials acquainted with the situation, the funds appropriated continue to be inadequate for even the proper administration of logging on State lands. In the words of the State forester, ". . . there has been little improvement in the technique of forest management and silvicultural practice on the part of the State in the past forty years." [20] Through the liquidation of the virgin timber on State lands without regard to sustained-yield capacity, the State stands to gain primarily in the more rapid increase of the funds dedicated by law to the schools and other public institutions. Far offsetting this gain are the penetrating chronic ills arising from industrial and community instability and dislocation.

The national forests as a whole operate on a sustained-yield basis, but under constant pressure to increase the cut beyond the sustainable point as a crutch to faltering communities. Although in certain instances the Forest Service has done this, the wisdom of this action is open to question. While affording temporary succor, it only postpones the evil day and gives relief which the same communities will have to pay for later several times over. To give aid in a form that will reduce the earning power of future generations would appear to be an extremely unsound long-time policy.

It is reasonable to expect that the management of State forests and national forests should attempt to minimize the effect of private liquidation, and that so far as possible the production of these forests should be based on the sustainable capacity of the public and private lands together rather than the public lands alone. For instance, if the sustainable cut of a unit were 50 million board feet per year, half private and half national forest, and if the private owners were logging 50 million board feet annually, the effect of overcutting by the private operators could, in part, be neutralized by reducing the production from public lands. At present the national forests are managed as independent units, without sufficient regard to the extent of overcutting on surrounding lands.

Two general conclusions seem fair. (1) Pressure for drastic curtailment of the excessive private cutting can hardly be justified, since the effect on communities concerned would be much too severe. (2) As far as possible,

[20] Idaho State Land Department. 24th biennial report, 1936–38. 34 pp., illus. [1938.]

the publicly owned western white pine should be held back to ease the situation being created by private overcutting.

Lest there be misunderstanding on the latter point it will be well to define precisely what is meant by "holding back." It would seem that the objective in the management of State and national forests would be to maintain the greatest reservoir of loggable timber for the day when private holdings are largely cut out in any particular unit. The simplest way to accomplish this would be to lock up the public timber for the time being. But in western white pine saw-timber stands, losses are occurring all the time. For some age classes the mortality is considerable. Thus, much good timber will die from insects, disease, and competition if not logged. By making light cuts now in such stands, it will be possible to get to the sawmills timber which would otherwise be lost. Growth will be accelerated, and the timber available in the future will be no less—or even greater—than if the stands had been locked up completely.

Finally, since cutting can neither be permitted to continue indefinitely at the rate of 351 million board feet of western white pine a year nor be restricted abruptly to sustained-yield limits, the middle course of realistic compromise must be taken by easing into a sustainable pace. Overcutting of privately owned white pine will probably have to continue, but by holding back on public stumpage and in other ways, reduction of cut should be continually stressed.

Requisite Protection and Management

The fire losses of northern Idaho are still too great. This is particularly so on private land. Large areas in private ownership are poorly protected or unprotected. About twice as much money should be spent in protecting State and private land as is spent at present, according to estimates of the protective agencies. Because many of the benefits of forest protection are enjoyed by all, it is fair that a portion of the cost on private land be borne by the public. The National Government has cooperated in fire protection on private lands through its appropriations under the Clarke-McNary Act of 1924 and through the C. C. C. Greater aid in fire protection under the Clarke-McNary Act is needed. Also every private owner should be required to contribute to the protection of his forest land, which is not the case at present.

All efforts to perpetuate the western white pine industry on a high level will fail if the supporting silvicultural and economic structure is allowed to be sapped by insufficient control over blister rust. The opinion of specialists contains no "probably" when speaking of what will happen if the disease is not controlled. The best Nation-wide analysis of the situation indicates that the present program of blister rust control as a national subsidy of a local industry is very desirable from the national viewpoint. Yet there is need for close bookkeeping to be sure that this heavy expenditure is made only on areas which will pay back a reasonable return. While the responsibilities of the public in connection with the forests are great, there is a definite upper limit beyond which the dollar invested is not justified by proportionate returns—tangible or intangible.

Foresters today are seriously considering the matter of the proper intensity of management. Just as the difference in returns per acre between the small truck garden and the large ranch are more or less in proportion to the labor invested, the yields from forest land likewise vary according to the work done per acre. Even the best management practices today in this region, and the minimum regulations proposed for all operators, represent relatively no more than an extensive forestry. Some intensification of forest practice is necessary if the base for the western white pine cut is to be kept from shrinking. It is reasonable to expect that management practices will be intensified as time goes on. But the evidence available and the various expert opinions on the subject have not been sifted down to the point where it is possible to say how much more labor can be profitably applied to forest land in northern Idaho.

Regulation

Logging by the lumber industry in northern Idaho is for the most part not destructive in the common sense of the word. Such fault as can be found is in respect to the completeness of the cut of western white pine rather than the method of logging. The logging of too-small western white pines or the failure to leave enough trees for seed source results in a distinct loss to the community. In some of the more accessible areas the heavy demands for fuel wood have brought on local problems of overcutting and misuse. This can be helped by education, and by the establishment and enforcement of minimum regulations to prevent maltreatment of forest lands.

The question of adequate slash disposal is more serious. Much damage has been done to residual stands through the burning of logging debris. Hazard reduction by slash disposal is a necessary job, but a ticklish one too, and one requiring expert supervision. The office of the State forester is charged with the task of policing this disposal on private land, but the effectiveness of this work has been limited by insufficient funds and organization.

To expect and hope that the timber will be cut and the slash disposed of in a manner to meet certain minimum standards is not enough. The people of Idaho in cooperation with the Federal Government have a right to insist on adherence to these standards. After all, it is they or their children who lose when future timber crops are delayed or diminished.

Zoning to prevent indiscriminate settlement has been used effectively elsewhere in the United States and could be turned to good purpose in northern Idaho. Through laudable but misguided and futile attempts to carve farms out of forest areas suitable only for growing trees, the settler is abusing the land and doing himself no good. County zoning to prevent this would have the added merit of reducing the costs of providing schools, roads, and other public services.

Cooperative Management

On the other hand, if the forest economy is to be stabilized and basic plans to that end are to be evolved, the mill owner and the community must have assurance that the timber in a given unit will be available when the time for cutting comes. In addition to cooperation between private individuals, it is necessary that the public, as an important owner, be a party to the contract and make binding commitments for the future. At the present time, however, State and national-forest timber disposed of in any quantity must be sold under a competitive bid, which precludes earmarking any portion of the resource for a mill or group of mills. The dangers inherent in eliminating competition from timber sales and in basing them on administrative decision are readily apparent. Yet these dangers can be avoided in large part by subjecting all transactions to full publicity, and by setting up adequate checks to insure fair play. It is imperative to untie the hands which manage the public timber so that future commitments can be made.

Acquisition

In the ownership discussion, the patchwork nature of the holdings was pointed out. In view of the private liquidation, it is desirable to have the public forests blocked out in compact units, probably by exchange. While the private operator may not be expected, under present conditions, to hold back the cutting of his timber, he does have a real community obligation to help block out public holdings, especially since by an equitable exchange he would suffer no monetary loss.

Regulation of cutting practices and zoning, although very necessary to remedy immediate ills, are no more than stopgaps in the handling of much of the area now privately owned. If any one thing has been demonstrated clearly in the preceding pages, it is that private individuals are not likely to continue indefinitely in the timber-growing business on a very considerable portion of the private area not in farms. The sooner the inevitable is accepted and steps are taken to speed the transfer of such lands to public ownership, the better for forest conservation in northern Idaho. Acquisition by purchase is the quickest and surest way of enlarging the public forests, but any extensive purchases are probably beyond the means of the State and the counties. In any Federal program of purchases, the desirability of acquiring Idaho lands must be weighed against the advantages to be derived from expenditure of the same money in the South, in the Lake States, or elsewhere. Therefore, it is difficult to say how far the Nation can go in purchasing lands in northern Idaho. This must be decided on a Nation-wide basis.

This acquisition problem can be attacked locally through the avenue of tax delinquency. Prompt foreclosure and no resale of tax-delinquent forest lands classified as unsuitable for agricultural development will save these areas from complete ruination through the desperate attempt of tax-sale purchasers to extract the last dollar from them without regard to consequences. Instead, these lands should be transferred to the State or the Federal Government. They may be donated or exchanged for timber which can be sold. However, the exchange possibilities are limited. Any expansion of the State's ownership should be preceded by the development of a well-rounded and fully supported State forestry program. Since this is an Idaho problem, the State should assume as much of the responsibility as it can bear.

There is the danger, often pointed out by the objectors to expanded public acquisition, that the areas acquired may include tracts suitable for private ownership. No such weakness can be found in an expansion program primarily directed toward the acquisition of tax-foreclosed lands. The same is true in the case of acquisition of lands by donation from the private owner, when these lands would otherwise become tax delinquent. In general, prolonged tax delinquency of forest land is prima-facie evidence that the area involved has failed to meet the requirements for successful private ownership. Thus, no one can fairly contend that the donation of such land infringes on the field of private enterprise. If the private owner, with reasonable public assistance, is required to treat his forest land properly as long as he holds it, and it comes to the public in a producing state, no great loss is involved in waiting for this process of public acquisition to run its course.

The specter of a reduced tax base has made, and probably will continue to make, the county officials hesitate to donate tax lands to the Federal Government. It is true that a small temporary loss of revenues will result, but more is at stake than a few tax dollars. The future earning power of these lands is involved. The same tax argument against public acquisition might have been made many years ago in the Lake States. Yet tax payments stopped when the lands were wrecked, and many acres in that region will be a liability for a long time in the future.

Summary of Action Needed

What is the biggest cause for concern about the northern Idaho forest situation? It is that, human nature being what it is, the present trend will continue and conditions

will have to be worse before public opinion will spontaneously and automatically mobilize to order decisive action. Such a course is too slow and uncertain. Public support for action now must be gained while the forest economy can still be kept from thudding on rock bottom. Federal and State agencies can appropriately take the lead.

The Federal program in northern Idaho should be broadened along six general lines. The Federal Government should:

1. Acquire such forest land as is unlikely to be adequately managed for continuous production by private or other public owners.

2. Appropriate more money to protect public forest lands from fire, insects, and disease, and to cooperate in furnishing the same protection to private lands.

3. Insist on certain minimum forest practices from the private owner in return for Federal cooperation in all its phases.

4. Pass legislation to permit noncompetitive sales of national-forest timber where such sales directly contribute to community stability.

5. Establish a policy of holding back, as far as practicable, the cutting of national-forest western white pine wherever the private cutting is exceeding the total productive capacity of an operating unit.

6. Investigate the possibilities of increasing the markets for the less-used species, and continue research along other lines such as silviculture, forest economics, products, influences, and range.

While there has been an unfortunate tendency to let the Federal Government take the initiative in conservation effort, the principal opportunities for improving the situation lie in local and State action. This form of action has the advantage of preventing any lag in public opinion elsewhere in the United States from hindering progress in northern Idaho. The people of Idaho should:

1. Place the State forests on a managed basis and hold back, as much as practicable, the cutting of western white pine timber in State ownership wherever private cutting is exceeding the total producing capacity of an operating unit.

2. Urge private owners to cut western white pine conservatively and make proper provision for its regeneration.

3. Appropriate sufficient funds for adequate administration of those State laws regulating private forest practice and strengthen these laws whenever necessary to keep private forest land productive.

4. Provide legislation permitting noncompetitive sales of State timber where such sales contribute directly to community stability.

5. Establish better fire protection on certain private and county lands.

6. Explore the possibilities of permanent private forestry through local planning boards and public forest agencies. Furnish results to timberland owners and increase forest extension service.

7. Effect economies in county governments through zoning for proper land use, and by other means.

8. Adjust taxing procedure so that taxes will not be an unduly heavy burden on the owner wishing to engage in permanent forestry.

9. Adopt a policy of transferring to the State tax-foreclosed forest lands unsuited for agricultural development if the State is prepared to protect and administer them, or if not, to the Federal Government.

10. Help the blocking out of public forests through exchange and donation.

These points outline no easy program, but it is a program which every farmer, laborer, and businessman should have tucked in his hat band. The day of new frontiers is gone. The day of three more jobs around the corner has passed with it. Northern Idaho is faced with the task of preserving the standard of living that it has achieved.

Forest conservation preserves more than trees; it preserves jobs, homes, and happiness.

Appendix

Timber Yield Calculations

The management calculations in this report have been based on area regulation. The theory of area regulation is this: With a 120-year rotation in which the one-cut method of logging is used, approximately 1/120 of the total stocked area should be cut yearly on the average. Multiplying this acreage by the volume of saw timber per acre to be obtained at rotation age provides an estimate of the allowable cut in board feet. The concept itself is easy to grasp. However, unmanaged areas are usually not easily converted into managed areas, primarily because there is a shortage of certain sizes of timber. This fact, together with the necessity for making adjustments for fire losses and the limitations of the basic data, make the practical application a bit more complicated than the simple theory.

Ideal Age Distribution

Certain hillsides now denuded of timber will, in the course of time, become restocked with a consequent reduction of the deforested area. On the other hand, some green areas will be swept by fire, and this will tend to add to the total deforested area. However, because of a continually improving job of fire protection, it is to be expected that the over-all trend will be toward a gradual reduction of the deforested area. Since this will be a long-time change, it is safest to assume for the immediate calculations that there will be no major change in this acreage and that the cut can be based on the present stocked area. Therefore, the plan will assume the logging of 1/120 of the stocked area each year and returning again to this year's acreage in 120 years. If this is to be possible, the stands to be logged in 20 years should be at least 100 years old today, the stands to be cut in 50 years should be 70 years old, and so on.

In figure 43 the proper cumulative distribution of area by age class is shown by the step-like solid line. The stands on one-sixth of the area should be 101–120 years (or older), on two-sixths (including the first one-sixth) 81–120 years, on three-sixths 61–120 years, with three more similar steps. It will be noted in figure 43 that the actual stand distribution for the stocked commercial forest area in northern Idaho exceeds these minimum requirements. For the purpose of illustration, however, suppose the stands shown in figure 43 to be 41–60 years old were just 21–40 years of age. In that case the bar for stands 41 years and older would be short of the ideal, and if logging were to proceed at the rate of 1/120 of the total area per year, a time would come when for a period there would be no timber of rotation age for logging. The only alternative (without shortening the rotation) would be to log the stands now older than 40 years at a slower rate to spread the production over the years required for the underage stands to reach the loggable stage and thus build up the growing stock.

Reduction for Fire Damage

With the adequate distribution of age classes as shown in figure 43, 1/120 of the stocked acreage could be logged annually only if no losses from fire and other causes occurred. Since fire annually destroys a very large volume of timber of all sizes, this loss cannot be allowed for by a straight reduction of the area cut by the acreage burned over. The

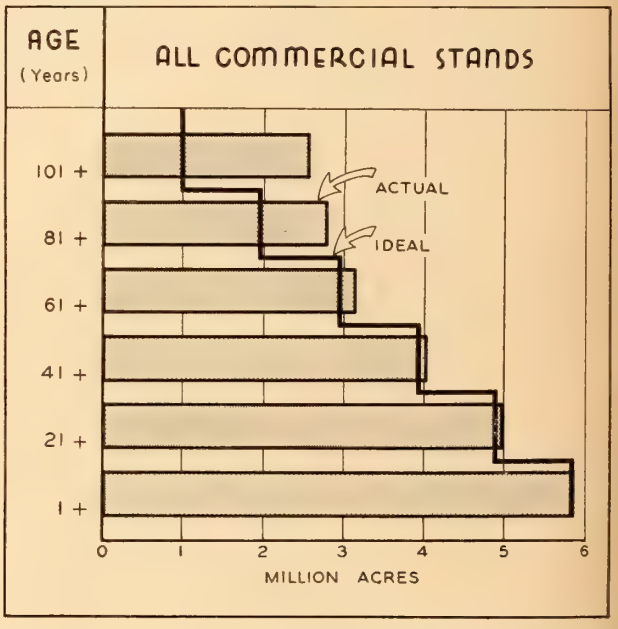


FIGURE 43.—*Present age distribution (cumulative) on all commercial forests and compared with ideal pattern for a 120-year rotation on a one-cut basis. Total stocked area equals 5.9 million acres.*

destruction of a pole stand or a seedling and sapling stand, while important, is not so serious as the loss of a saw-timber stand. Suppose for example, that in a particular area there is only enough saw timber to care for the sustained-yield cutting budget for a few years. In that case, every acre of saw timber destroyed requires a like reduction of logged area (except for such salvage as is possible). What has been lost on each acre, as far as the rotation calculations are concerned, is 120 years of growth. The average pole stand is roughly 60 years old—just half grown. So, when an acre of poles is destroyed by fire, only 60 years of growth are lost. Assuming restocking is no harder in one case than another, from a management standpoint, this loss is just half as serious as an equal area loss of saw timber. This can be expressed in terms of cut by saying that for every 2 acres of pole stand destroyed by fire, 1 acre less of saw timber should be logged. In the same way a fire loss in the average seedling and sapling stand, estimated to be about 20 years in age, can be expressed in terms of saw timber by the ratio of six to one.

In the case of an operating unit with an excess of older stands, as in figure 43, the reduction for fire losses in saw timber must also be modified. For illustration, suppose fire consumes a portion of the mature saw-timber stand which, according to the cutting plan will not be reached for 50 years. To keep the area cut in balance, it will be theoretically necessary to reduce the cut no more than if a 70-year-old stand had been

on the area, or by 70/120.[21] Therefore if the saw-timber stands of a unit are sufficient to last 50 years on a sustained-yield basis, it is assumed that the logged area should be reduced by 95/120 of an acre for every saw-timber acre burned (average of 70 and 120). Likewise, if the 60-year-old pole stands are not to be cut for 65 years, owing to an excess of older age classes, the cut need only be reduced by 55/120 for damage in these stands. Therefore, the effective area-loss figure for all commercial forest area in northern Idaho may be translated into reduced cut in the following fashion:

	Area annually burned 1931-37		*Conversion factor*		*Effective annual area loss*
	Acres				*Acres*
Saw-timber stands	9,300	×	95/120	=	7,400
Pole stands	6,500	×	55/120	=	3,000
Seedling and sapling stands	11,100	×	20/120	=	1,800
Total area deduction for fire losses					12,200

Volumes

After the logging has proceeded for a number of years, theoretically each acre of timber cut will be 120 years of age at the time of logging. At that time the sustainable volume cut will be the allowable acreage times volume per acre at 120 years. The bulk of the present virgin timber is now older than 120 years. On much of the area supporting this saw timber the volume is greater than it was at 120 years, but on some of it the reverse is true. Inasmuch as the only volume which will be logged for a considerable period is that which is already there, the volumes per acre used in this calculation are those of the present saw-timber stands, regardless of age. The critical reader may take exception to this on the grounds that many of the saw-timber stands will make additional growth before their cutting date. This is especially true in the Clearwater district, where a large area of saw timber is less than 120 years old. However, fire losses which will occur in this additional growth have not been adjusted for. Furthermore, several other compensating factors such as increased insect losses make this a more reasonable calculation than it might appear at first glance.

Calculations of Allowable Cut

With the assumptions and methods just described, the following calculations were made to arrive at the estimates of allowable cut used in the chapter on forest-management possibilities:

THE ALLOWABLE ANNUAL CUT OF ALL SPECIES IN NORTHERN IDAHO

Area of stocked commercial forest land, excluding cottonwood (fig. 43)	acres	5,869,400
Annual area cut before deducting for fire loss (1/120)	acres	48,900
Area reduction for fire loss	do	12,200
Net area cut	do	36,700
Volume per acre in saw-timber stands	board feet	14,100
Allowable annual cut, all species	do	518,000,000

THE ALLOWABLE ANNUAL CUT OF WESTERN WHITE PINE IN NORTHERN IDAHO

Area of stocked western white pine land (fig. 44)	acres	2,348,800
Annual area cut allowing for age deficiency (stands older than 20 years spread over 100 years)	acres	17,900
Area reduction for fire loss	do	2,900
Net area cut	do	15,000
Volume of western white pine per acre in saw-timber stands	board feet	9,300
Allowable annual cut of western white pine	do	140,000,000

[21] The greater actual volume loss (equal to the difference between the volume which the present saw-timber stand would have in 50 years and the volume the 70-year-old stand would reach by that time) is not so important as the ages might indicate, since many of the present saw-timber stands are slowing up in growth, remaining stationary, or declining.

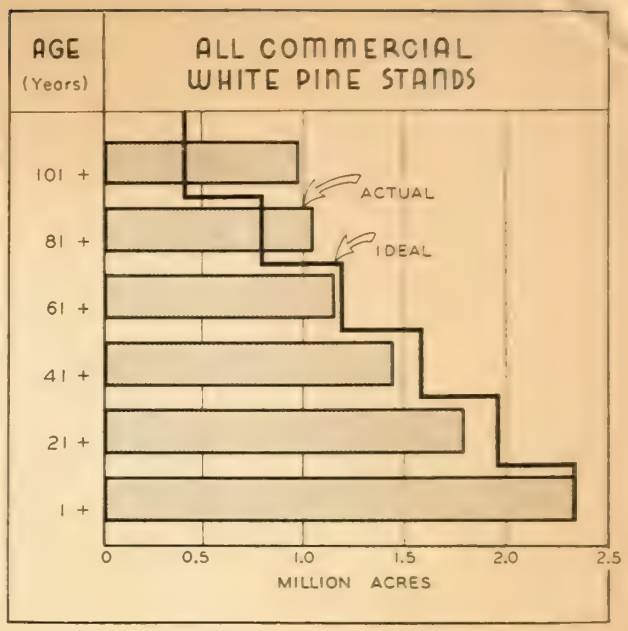


FIGURE 44.—*Present age distribution (cumulative) of all commercial western white pine stands compared with ideal pattern for a 120-year rotation on a one-cut basis.*

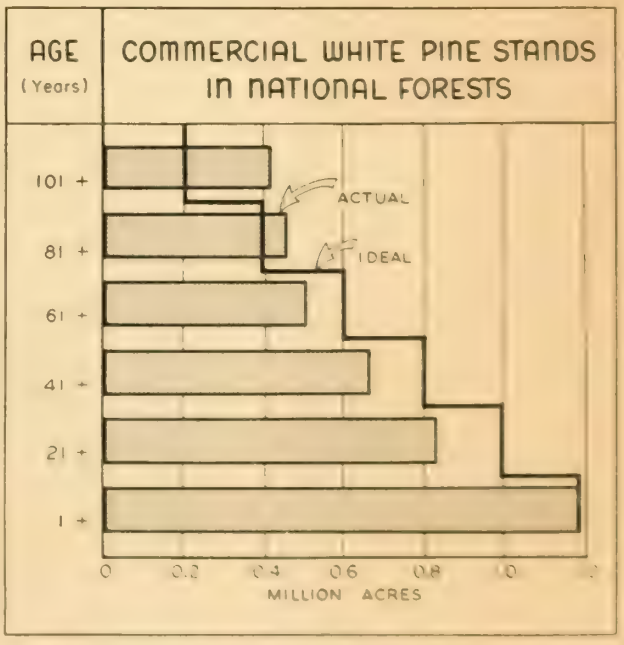


FIGURE 45.—[illegible]

THE ALLOWABLE ANNUAL CUT OF WESTERN WHITE PINE ON NATIONAL FORESTS OF NORTHERN IDAHO

Area of stocked western white pine land (fig. 45)..acres..	1,188,100
Annual area cut allowing for age deficiency (stands older than 40 years spread over 80 years).....acres....	8,300
Area reduction for fire loss.....do....	2,100
Net area cut.....acres	6,200
Volume of western white pine per acre in saw-timber stands.....board feet..	7,600
Allowable annual cut of western white pine.....do....	47,000,000

ALLOWABLE ANNUAL CUT OF WESTERN WHITE PINE OUTSIDE OF CLEARWATER DISTRICT

Area of stocked western white pine land (fig. 46)...acres..	1,575,800
Annual area cut (spreading stands older than 60 years over a period of 60 years).....do....	11,300
Area reduction for fire loss.....do....	2,600
Net area cut.....do..	8,700
Volume of western white pine per acre in saw-timber stands.....board feet..	7,400
Allowable annual cut of western white pine.....do....	64,000,000

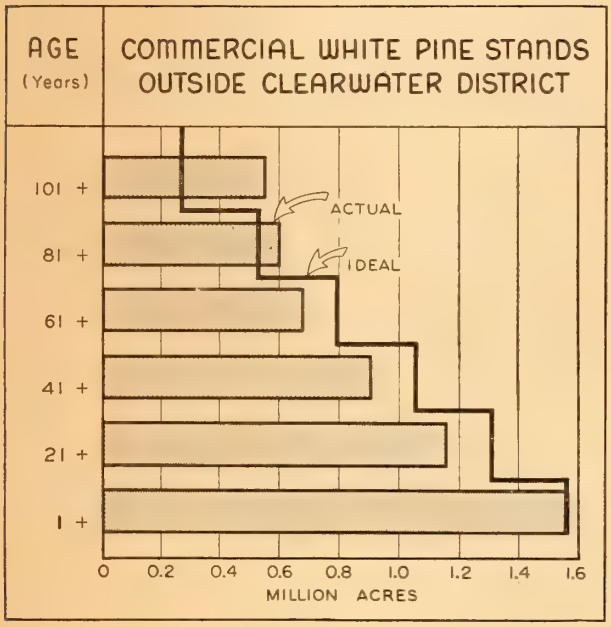


FIGURE 46.—*Present age distribution (cumulative) of commercial western white pine stands outside of the Clearwater district compared with an ideal pattern for a 120-year rotation on a one-cut basis.*

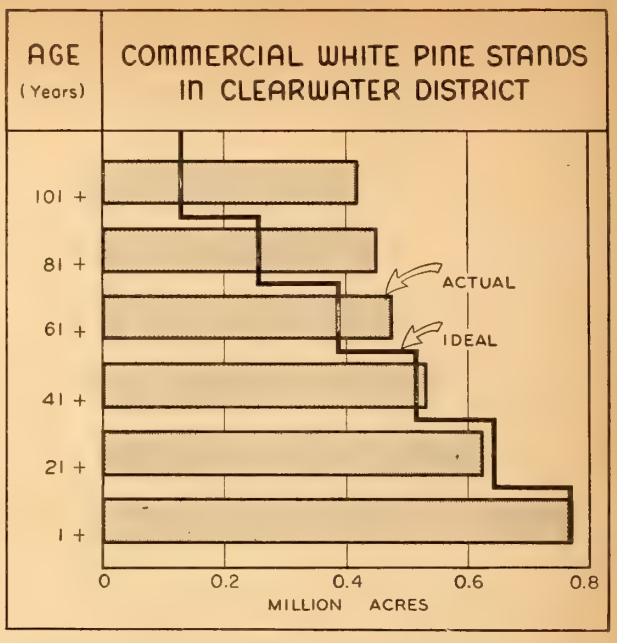


FIGURE 47.—*Present age distribution (cumulative) of commercial western white pine stands in the Clearwater district compared with ideal pattern for a 120-year rotation on a one-cut basis.*

ALLOWABLE ANNUAL CUT OF WESTERN WHITE PINE IN THE CLEARWATER DISTRICT

Area of stocked western white pine land (fig. 47)..acres..	773,000
Annual area cut (spreading stands older than 20 years over a period of 100 years).....acres....	6,300
Area reduction for fire loss.....do....	400
Net area cut.....do....	5,900
Volume of western white pine per acre in saw-timber stands.....board feet..	12,000
Allowable annual cut of western white pine.....do....	71,000,000

Supplementary Tables

TABLE 8.—*Forest-land area by ownership [1] and broad commercial classes, northern Idaho.*

Forest land class	Large private	Small private	State	County	Indian reservation	Public domain	Water-power reservation	Total	National forest	Total, all ownerships
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Commercial forest land [2]	1,179.7	1,501.9	614.4	108.2	40.7	179.8	48.1	3,672.8	3,194.6	6,867.4
Noncommercial forest land:										
Withdrawn from timber use [3]			5.8					5.8	229.8	235.6
Chiefly valuable for purposes other than timber production [4]	174.8	30.1	72.5	3.1	.2	38.7	30.0	349.4	2,877.4	3,226.8
Total	1,354.5	1,532.0	692.7	111.3	40.9	218.5	78.1	4,028.0	6,301.8	10,329.8

[1] Ownership data as of 1934: forest areas as of Jan. 1, 1939.

[2] Land capable of producing commercial timber and economically accessible now or prospectively, and not reserved from cutting.

[3] Land capable of producing commercial timber and economically accessible, now or prospectively, but reserved from cutting.

[4] Consists of subalpine and other forest land which because of low productivity or extreme inaccessibility appear to be permanently out of the commercial timber-producing class.

TABLE 9. *Ownership of forest land*[1] *by forest district and county, northern Idaho.*

ALL FOREST LAND

Forest district and county	Large private	Small private	State	County	Indian reservation	Public domain	Water-power reservation	Total	National forest	Total all ownerships
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Sandpoint:										
Boundary	136.4	87.3	97.6	6.0	0.8	5.6	0.7	334.2	439.8	774.0
Bonner	175.0	242.4	147.5	36.1		36.2		617.2	427.8	1,045.0
Total	311.4	329.7	245.1	42.1	.8	41.8	.7	951.4	847.6	1,799.0
Coeur d'Alene-St. Joe:										
Kootenai	61.9	295.4	29.3	18.7		28.4		433.7	295.4	729.1
Benewah	122.2	134.5	37.2	31.3	15.1	29.4		369.7	46.2	415.9
Shoshone	249.2	136.3	56.8	11.4		78.6	1.0	733.3	1,426.1	2,159.4
Total	433.3	566.2	123.3	61.4	15.1	136.4	1.0	1,336.7	1,178.2	2,733.9
Clearwater:										
Latah	98.1	161.6	38.8	1.2		.7		300.4	100.0	400.4
Clearwater	388.3	164.5	230.1	3.7	6.4	19.7	3.8	816.5	698.5	1,515.0
Total	486.4	326.1	268.9	4.9	6.4	20.4	3.8	1,116.9	798.5	1,915.4
Winchester:										
Lewis	20.1	45.3	.9	.4	12.0	3.4		82.1		82.1
Nez Perce	8.3	85.1	6.0	1.0	3.9	5.3		109.6		109.6
Total	28.4	130.4	6.9	1.4	15.9	8.7		191.7		191.7
Idaho County	95.0	179.6	48.5	1.5	2.7	31.2	72.8	431.3	3,277.7	3,708.8
Total, all counties	1,354.5	1,532.0	692.7	111.3	40.9	218.5	78.1	4,028.0	6,301.8	10,329.8

COMMERCIAL FOREST LAND[2]

Sandpoint:										
Boundary	101.8	85.6	48.8	5.7	.7	5.5	.4	248.5	305.7	554.2
Bonner	168.9	241.2	134.0	34.8		14.4		593.3	344.1	937.4
Total	270.7	326.8	182.8	40.5	.7	19.9	.4	841.8	649.8	1,491.6
Coeur d'Alene-St. Joe:										
Kootenai	61.8	292.9	28.7	18.0		22.9		424.3	200.4	624.7
Benewah	121.0	132.5	30.9	30.8	15.1	20.8		351.1	45.6	396.7
Shoshone	226.7	128.4	50.3	11.4		60.1	.9	477.8	929.4	1,407.2
Total	409.5	553.8	109.9	60.2	15.1	103.8	.9	1,253.2	1,175.4	2,428.6
Clearwater:										
Latah	97.9	161.4	38.8	1.2		.7		300.0	99.4	399.4
Clearwater	330.8	162.8	229.6	3.7	6.5	18.7	2.9	755.0	687.3	1,442.3
Total	428.7	324.2	268.4	4.9	6.5	19.4	2.9	1,055.0	786.7	1,841.7
Winchester:										
Lewis	19.9	43.7	.7	.5	11.9	3.1		79.8		79.8
Nez Perce	8.4	79.0	5.6	.7	3.9	4.2		101.8		101.8
Total	28.3	122.7	6.3	1.2	15.8	7.3		181.6		181.6
Idaho County	42.5	174.4	47.0	1.4	2.6	29.4	48.9	346.2	882.2	1,228.4
Total, all counties	1,179.7	1,501.9	614.4	108.2	40.7	179.8	48.1	3,672.8	3,194.6	6,867.4

[1] Ownership data as of 1934; forest areas as of Jan. 1, 1939.

[2] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

TABLE 10.—*Ownership*[1] *of commercial forest land*[2] *by forest type and stand class, northern Idaho*

Forest type and stand class	Large private	Small private	State	County	Indian Reservation	Public domain	Water-power reservation	Total	National forest	Total, all ownerships
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Western white pine:										
Saw timber	347.5	41.1	181.9	3.7	----	10.4	0.8	585.4	442.1	1,027.5
Pole	63.7	115.0	46.5	10.7	----	20.2	----	256.1	277.4	533.5
Seedling and sapling	117.3	92.2	70.1	15.0	----	24.2	.4	319.2	468.6	787.8
Total	528.5	248.3	298.5	29.4	----	54.8	1.2	1,160.7	1,188.1	2,348.8
Ponderosa pine										
Saw timber	84.7	224.2	70.3	5.5	12.2	16.2	18.0	431.1	217.2	648.3
Pole	45.5	336.8	19.4	12.8	15.8	17.3	2.3	449.9	43.0	492.9
Seedling and sapling	28.3	94.2	6.7	5.3	7.4	4.1	.7	146.7	31.1	177.8
Total	158.5	655.2	96.4	23.6	35.4	37.6	21.0	1,027.7	291.3	1,319.0
Larch-Douglas-fir:										
Saw timber	105.2	59.0	42.5	5.1	.3	7.4	1.4	220.9	165.7	386.6
Pole	45.6	157.4	25.0	13.2	.9	16.4	.7	259.2	156.4	415.6
Seedling and sapling	22.8	65.0	14.6	7.0	----	9.3	.8	119.5	129.9	249.4
Total	173.6	281.4	82.1	25.3	1.2	33.1	2.9	599.6	452.0	1,051.6
Hemlock-grand fir:										
Saw timber	27.5	6.6	12.5	.3	----	.5	.9	48.3	89.2	137.5
Pole	.8	5.0	.2	.3	.1	----	.3	6.7	12.4	19.1
Seedling and sapling	.5	1.4	----	----	----	.7	.1	2.7	4.3	7.0
Total	28.8	13.0	12.7	.6	.1	1.2	1.3	57.7	105.9	163.6
Douglas-fir:										
Saw timber	10.2	15.6	10.6	.6	.2	3.2	1.6	42.0	92.1	134.1
Pole	5.9	39.7	7.2	1.0	1.7	8.0	1.8	65.3	71.8	137.1
Seedling and sapling	1.5	12.4	2.1	.1	.6	2.3	.5	19.5	24.5	44.0
Total	17.6	67.7	19.9	1.7	2.5	13.5	3.9	126.8	188.4	315.2
Engelmann spruce:										
Saw timber	26.9	1.6	4.2	.4	----	1.1	----	34.2	73.2	107.4
Pole	1.0	.3	.9	----	----	----	----	2.2	11.3	13.5
Seedling and sapling	1.1	----	.3	----	----	----	----	1.4	6.0	7.4
Total	29.0	1.9	5.4	.4	----	1.1	----	37.8	90.5	128.3
Lodgepole pine:										
Saw timber	1.2	2.0	.4	.1	----	----	----	3.7	6.4	10.1
Pole	3.1	13.8	7.3	.6	----	4.2	.1	29.1	112.2	141.3
Seedling and sapling	16.2	29.2	5.3	2.5	----	4.9	.1	58.2	114.4	172.6
Total	20.5	45.0	13.0	3.2	----	9.1	.2	91.0	233.0	324.0

TABLE 10.—*Ownership of commercial forest land by forest type and stand class, northern Idaho* [Continued]

Forest type and stand class	Large private	Small private	State	County	Indian Reservation	Public domain	Water-power reserves [2]	Total	Nat[illegible] forest	T[illegible] ownership
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Western redcedar:										
Saw timber [3]	9.3	1.2	2.5	.5		.1	.4	14.0	26.6	40.[illegible]
Pole, seedling and sapling	.5	.1	.3	.3			.2	1.4	1.4	2.[illegible]
Total	9.8	1.3	2.8	.8		.1	.6	15.4	28.0	43.4
Redcedar-grand fir:										
Saw timber	21.1	8.2	11.4	.4	.1	.8	3.7	45.7	62.4	108.[illegible]
Pole	3.5	7.3	3.6	.6	.1	.5	1.7	17.3	29.9	47.[illegible]
Seedling and sapling	.6	2.4	1.8	.3			1.6	6.7	23.[illegible]	29.2
Total	25.2	17.9	16.8	1.3	.2	1.3	7.0	69.7	105.8	175.[illegible]
Cottonwood:										
Saw timber	.5	3.7	.3	.4	.2	.4		5.5	1	[illegible]
Pole, seedling and sapling	.6	6.8	.2	.1	.2	.3		8.2	2	8.[illegible]
Total	1.1	10.5	.5	.5	.4	.7		13.7	.3	.4.0
All stocked commercial forest land:										
Saw timber	634.1	363.2	336.6	17.0	13.0	40.1	26.8	1,430.8	1,175.0	2,605.8
Pole [4]	169.7	682.1	110.3	39.3	18.8	65.9	6.9	1,094.0	704.6	1,798.6
Seedling and sapling [5]	188.8	296.9	101.2	30.5	8.0	45.5	4.4	675.3	803.7	1,479.0
Total	992.6	1,342.2	548.1	86.8	39.8	152.5	38.1	3,200.1	2,683.3	5,883.4
Nonstocked burns	57.3	82.3	27.9	12.3	[illegible].8	21.4	9.9	241.[illegible]	451.[illegible]	[illegible]
Nonstocked cut-overs [6]	129.8	77.4	38.4	9.1	1	[illegible].9	1	260.8	59.7	320.5
Total	187.1	159.7	66.3	21.4	9	27.3	10.0	472.7	511.3	984.0
Total, all commercial forest land	1,179.7	1,501.9	614.4	108.2	40.7	179.8	48.1	3,672.8	3,194.6	6,867.4

[1] Ownership data as of 1934; forest areas as of Jan. 1, 1939.

[2] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[3] Since large pole stands of "cedar" and cedar-grand fir average more than 11 inches d.b.h., they are classed as saw timber stands in this and succeeding tables.

[4] Includes all nonsawlog cottonwood stands.

[5] Includes small pole and seedling and sapling western red cedar stands

[6] Includes some cut-over area, for which the condition of forest cover is undetermined and of which some is stocked.

TABLE 11.—*Ownership of stocked commercial forest land by forest type and stand and cutting condition, northern Idaho* [1]

Forest type and stand and cutting condition	Large private	Small private	State	County	Indian reservation	Public domain	Water-power reservation	Total	National forest	Total, all ownerships
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Western white pine:										
Saw timber:										
Partially cut	16.8	3.1	4.6	0.2				24.7	10.3	35.0
Uncut	330.7	38.0	177.3	3.5		10.4	0.8	560.7	431.8	992.5
Pole, seedling and sapling:										
Cut	68.2	126.2	37.7	13.2		9.2	.2	254.7	159.9	414.6
Uncut	112.8	81.0	78.9	12.5		35.2	.2	320.6	586.1	906.7
Ponderosa pine:										
Saw timber:										
Partially cut	13.0	37.7	6.6	.2	2.6	.8	.3	61.2	4.5	65.7
Uncut	71.7	186.5	63.7	5.3	9.6	15.4	17.7	369.9	212.7	582.6
Pole, seedling and sapling:										
Cut	58.6	257.7	13.6	12.2	17.6	8.7	.4	368.8	20.2	389.0
Uncut	15.2	173.3	12.5	5.9	5.6	12.7	2.6	227.8	53.9	281.7
All other types:										
Saw timber:										
Partially cut	96.4	39.8	23.4	2.6	.1	1.5	.2	164.0	45.8	209.8
Uncut	105.5	58.1	61.0	5.2	.7	12.0	7.8	250.3	469.9	720.2
Pole, seedling and sapling:										
Cut	53.7	187.0	22.7	14.2	1.1	5.5	.5	284.7	36.1	320.8
Uncut	50.0	153.8	46.1	11.8	2.5	41.1	7.4	312.7	652.1	964.8
Total all types:										
Saw timber:										
Partially cut	126.2	80.6	34.6	3.0	2.7	2.3	.5	249.9	60.6	310.5
Uncut	507.9	282.6	302.0	14.0	10.3	37.8	26.3	1,180.9	1,114.4	2,295.3
Pole, seedling and sapling:										
Cut	180.5	570.9	74.0	39.6	18.7	23.4	1.1	908.2	216.2	1,124.4
Uncut	178.0	408.1	137.5	30.2	8.1	89.0	10.2	861.1	1,292.1	2,153.2

[1] Commercial forest land is land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting. Ownership data as of 1934; forest areas as of January 1, 1939. The forest types on cut-over areas are based on the stand composition after logging. The practice of cutting chiefly western white pine from many areas and leaving a stand of mixed species accounts in part for the large area of partially cut saw-timber stands of types other than western white pine. Partially cut saw-timber stands have been cut over but still meet the minimum requirements for a saw-timber stand. Cut over saw-timber stands that do not meet this minimum are classified either as cut pole, seedling, and sapling stands or are carried in the preceding table as nonstocked cut-overs. A portion of the cut-over area in national forest and county ownerships was acquired after logging. Uncut pole, seedling, and sapling stands have invariably followed fire.

TABLE 12.—*Timber-age classes of commercial forest land,*[1] *by forest type, northern Idaho*

Forest type [2]	Age class in years											Total
	Unstocked [3]	1–20	21–40	41–60	61–80	81–100	101–120	121–140	141–160	161–200	200+	
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Western white pine	606.6	556.8	348.1	290.5	100.6	77.6	247.1	209.7	108.6	150.7	259.1	2,955.4
Ponderosa pine	168.1	89.9	216.6	240.0	73.8	56.4	57.6	68.3	90.6	182.8	243.0	1,487.1
Larch-Douglas-fir	88.3	121.3	200.3	185.2	91.7	61.0	45.5	80.4	86.5	85.7	94.0	1,139.9
Hemlock-grand fir	2.1	.8	7.4	7.1	4.4	3.8	13.6	16.6	23.5	27.4	59.0	165.7
Douglas-fir	52.6	12.6	44.6	80.8	21.6	21.1	28.5	35.3	40.9	17.4	12.4	367.8
Engelmann spruce	7.1	3.9	3.5	7.7	3.8	2.3	6.3	6.8	8.4	27.8	57.8	135.4
Lodgepole pine	15.1	85.7	93.3	59.6	36.9	17.5	16.9	5.6	5.6	2.5	.4	339.1
Western redcedar	6.3	.5	.1	1.1	.6	.9	1.1	2.1	.9	2.1	34.0	49.7
Cedar-grand fir	37.8	22.2	11.5	18.7	8.1	9.2	12.7	19.5	29.9	13.6	30.1	213.3
Total	984.0	893.7	925.4	890.7	341.5	249.8	429.3	444.3	394.9	510.0	789.8	6,853.4

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] The cottonwood type is not classified by age, and therefore is not included in this table.

[3] Includes some cut-over area, for which condition of forest cover is undetermined and of which some is stocked.

TABLE 13.—*Timber-age classes of commercial forest land,*[1] *by ownership,*[2] *northern Idaho*

ALL TYPES

Ownership class[3]	Age class in years										Total
	Unstocked[4]	1–20	21–40	41–60	61–80	81–100	101–120	121–140	141–160	161–200	200+	
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
Large private	187.1	121.5	97.3	71.1	38.8	44.3	108.1	109.3	71.0	113.8	216.3	1,178.6
Small private	159.7	139.7	316.5	331.4	113.2	75.4	54.4	74.4	51.4	89.2	86.1	1,491.4
State	66.3	59.7	63.5	47.3	27.5	27.4	51.1	91.2	44.6	51.8	83.5	613.9
County	21.4	21.8	17.2	12.6	10.1	7.2	2.8	2.9	2.8	3.1	5.8	107.7
Indian reservation	.9	1.0	14.3	9.9	.9	1.0	2.3	3.6	.3	3.3	2.8	40.4
Public domain	27.3	19.4	32.5	39.5	14.4	5.8	5.4	7.3	6.3	9.9	11.3	179.1
Water-power reservation	10.0	2.8	2.8	2.7	1.2	1.0	1.8	2.3	6.1	5.8	11.6	48.1
National forest	511.3	527.8	381.3	376.2	135.4	87.7	203.4	153.3	212.4	233.1	372.4	3,194.3
Total	984.0	893.7	925.4	890.7	341.5	249.8	429.3	444.3	394.9	510.0	789.8	6,853.4

WHITE PINE TYPE ONLY

Large private	137.1	85.4	46.4	33.0	13.8	19.4	76.7	77.5	35.4	44.8	96.1	665.6
Small private	63.6	47.4	70.6	64.2	20.2	6.8	8.6	11.9	4.8	5.3	8.5	311.9
State	51.1	41.6	42.5	19.4	12.2	12.3	34.0	56.9	20.0	25.6	34.0	349.6
County	8.8	12.0	6.3	4.3	2.6	.3	.6	.5	1.2	.6	1.0	38.2
Public domain	14.0	12.6	14.8	14.3	2.6	.3	2.1	1.9	.6	2.0	3.6	68.8
Water-power reservation	.1	.3	.1					.1	.2		.5	1.3
National forest	331.9	357.5	167.4	155.3	49.2	38.5	125.1	60.9	46.4	72.4	115.4	1,520.0
Total	606.6	556.8	348.1	290.5	100.6	77.6	247.1	209.7	108.6	150.7	259.1	2,955.4

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] Ownership data of 1934, adjusted to forest areas as of January 1, 1939.

[3] The cottonwood type is not classified by age, and therefore is not included in this table.

[4] Includes some cut-over area, for which condition of forest cover is undetermined and of which some is stocked.

TABLE 14.—*Saw-timber volume on commercial forest land [1] by species and ownership, [2] northern Idaho*

SCRIBNER LOG-RULE VOLUMES

Stand condition and ownership class	Western white pine	Ponderosa pine	Western larch	Douglas-fir	Grand fir[3]	Western red-cedar [4]	Western hemlock [5]	Engelmann spruce	Lodgepole pine [6]	Black cottonwood	All species	Cedar poles
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Thousand pieces*
Saw-timber stands:												
Large private	4,094.0	638.4	1,419.2	1,602.2	1,818.5	1,159.3	211.5	715.6	56.1	1.5	11,716.3	2,613.3
Small private	361.8	1,438.4	439.6	837.0	394.6	130.1	28.4	56.7	24.7	21.9	3,733.2	310.8
State	1,821.4	516.4	432.9	891.4	913.4	589.5	135.7	174.4	22.7	2.0	5,499.8	1,684.4
County	23.7	33.3	40.0	40.0	23.3	9.7	4.2	4.8	1.7	2.7	183.4	21.6
Indian reservation		69.3	2.1	17.6	1.2	.2				1.0	91.4	.4
Public domain	87.5	93.4	53.5	101.3	59.3	20.1	10.7	22.8	2.4	2.3	453.3	56.6
Water-power reservation	8.2	141.4	9.1	42.1	32.0	36.7	.1	8.2	.7		278.5	34.5
Total	6,396.6	2,930.6	2,396.4	3,531.6	3,242.3	1,945.6	390.6	982.5	108.3	31.4	21,955.9	4,721.6
National forest	3,566.8	1,953.2	1,730.4	2,897.9	2,408.5	1,393.1	482.1	1,366.3	212.6	.4	16,011.3	1,549.0
All ownerships	9,963.4	4,883.8	4,126.8	6,429.5	5,650.8	3,338.7	872.7	2,348.8	320.9	31.8	37,967.2	6,270.6
Pole, seedling, and sapling stands:												
Large private	72.4	80.5	101.0	134.8	59.2	24.9	11.1	12.0	33.7	.1	529.7	73.8
Small private	117.3	555.9	241.6	402.9	126.6	46.0	23.7	27.9	130.4	.4	1,672.7	140.1
State	46.2	43.4	49.9	70.2	31.3	14.6	9.0	20.6	47.9		327.1	64.7
County	12.7	22.4	22.7	28.9	9.0	5.5	3.5	2.6	8.5		115.8	15.6
Indian reservation	.3	22.0	2.8	7.5	1.6	.1			3.1		37.4	.2
Public domain	10.1	26.1	19.1	30.3	10.6	3.7	1.8	5.9	24.4		132.0	12.7
Water-power reservation	.3	4.6	1.2	5.6	9.2	2.7		.5	1.1		25.2	1.9
Total	253.3	754.9	438.3	680.2	247.5	97.5	49.1	69.5	249.1	.5	2,839.9	309.0
National forest	190.7	93.8	217.2	308.1	205.6	69.6	40.3	111.3	393.4		1,630.0	320.4
All ownerships	444.0	848.7	655.5	988.3	453.1	167.1	89.4	180.8	642.5	.5	4,469.9	629.4
Aggregate, all stands	10,407.4	5,732.5	4,782.3	7,417.8	6,103.9	3,505.8	962.1	2,529.6	963.4	32.3	42,437.1	6,900.0

LUMBER TALLY VOLUMES

Saw-timber stands:												
Large private	4,994.7	740.6	1,703.1	1,922.6	2,182.2	1,391.2	253.8	858.7	67.3	1.7	14,115.9	2,613.3
Small private	441.4	1,668.6	527.5	1,004.4	473.5	156.1	34.1	68.0	29.7	25.4	4,428.7	310.8
State	2,222.1	599.0	519.5	1,069.7	1,096.1	707.4	162.9	209.3	27.3	2.3	6,615.6	1,684.4
County	28.9	38.6	48.0	48.0	28.0	11.7	5.0	5.8	2.0	3.1	219.1	21.6
Indian reservation		80.4	2.5	21.1	1.4	.2				1.2	106.8	.4
Public domain	106.8	108.3	64.2	121.6	71.2	24.1	12.8	27.4	2.9	2.7	542.0	56.6
Water-power reservation	10.0	164.0	10.9	50.5	38.4	44.0	.1	9.8	.8		328.5	34.5
Total	7,803.9	3,399.5	2,875.7	4,237.9	3,890.8	2,334.7	468.7	1,179.0	130.0	36.4	26,356.6	4,721.6
National forest	4,351.5	2,265.7	2,076.5	3,477.5	2,890.2	1,671.7	578.5	1,639.6	255.1	.5	19,206.8	1,549.0
All ownerships	12,155.4	5,665.2	4,952.2	7,715.4	6,781.0	4,006.4	1,047.2	2,818.6	385.1	36.9	45,563.4	6,270.6
Pole, seedling, and sapling stands:												
Large private	88.3	93.4	121.2	161.8	71.1	29.9	13.3	14.4	40.4	.1	633.9	73.8
Small private	143.1	644.9	289.9	483.5	151.9	55.2	28.4	33.5	156.5	.5	1,987.4	140.1
State	49.0	50.3	59.9	84.2	37.6	17.5	10.8	24.7	57.5		391.5	64.7
County	15.5	26.0	27.3	34.7	10.8	6.6	4.2	3.1	10.2		138.4	15.6
Indian reservation	.4	25.5	3.4	9.0	1.9	.1			3.7		44.0	.2
Public domain	12.3	30.3	22.9	36.4	12.7	4.5	2.2	7.1	29.3		157.7	12.7
Water-power reservation	.4	5.3	1.4	6.7	11.0	3.2		.6	1.3		29.9	1.9
Total	309.0	875.7	526.0	816.3	297.0	117.0	58.9	83.4	298.9	.6	3,382.8	309.0
National forest	232.7	108.8	260.6	369.7	246.7	83.5	48.4	133.6	472.1		1,956.1	320.4
All ownerships	541.7	984.5	786.6	1,186.0	543.7	200.5	107.3	217.0	771.0	.6	5,338.9	629.4
Aggregate, all stands	12,697.1	6,649.7	5,738.8	8,901.4	7,324.7	4,206.9	1,154.5	3,035.6	1,156.1	37.5	50,902.3	6,900.0

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] Ownership data, 1934, adjusted to forest areas as of January 1, 1939.

[3] Includes some alpine fir.

[4] Includes volume of cedar poles shown in pieces in last column (180 board feet per piece in saw-timber stands and 50 board feet per piece in poles, seedling, and sapling stands).

[5] Includes some mountain hemlock.

[6] Includes some whitebark pine.

TABLE 15. *Saw-timber volume, Scribner log rule, on commercial forest land[1] by species and forest type, 1952*

Stand condition and forest type	Western white pine	Ponderosa pine	Western larch	Douglas-fir	Grand fir[2]	Western redcedar[3]	Western hemlock	Engelmann spruce	Lodgepole pine	Other species[4]	All species	Cedar poles[5]
	Million board feet	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Thousand pieces*
Saw-timber stands												
Western white pine	9,554.0	192.8	1,770.9	2,413.4	3,092.0	2,052.8	571.1	1,041.5	137.6		20,826	1,467
Ponderosa pine	35.0	4,412.7	397.2	1,259.3	274.9	37.3	5.1	17.9	19.0	9.1	6,479	126
Larch-Douglas-fir	134.8	141.0	1,620.4	1,326.7	438.9	117.6	47.2	133.4	55.2	7.0	4,022	282
Hemlock-grand fir	8.5	24.9	68.0	177.3	933.0	23.7	83.5	70.5	14.8		1,403.2	22
Douglas-fir	54.2	72.2	39.2	947.8	187.1	30.8	1.4	34.0	11.7		1,378.4	58
Engelmann spruce	52.2	1.3	93.8	86.2	103.9	33.1	31.2	957.8	31.3		1,390.8	4
Lodgepole pine	5.4	2.1	9.4	8.4	3.3	.2	.4	5.3	48.3		82.8	
Western redcedar	56.2	1.0	34.6	36.5	59.5	592.5	118.1	48.9	.5		947.8	2
Cedar-grand fir	63.1	35.8	92.9	173.7	168.2	450.7	14.7	33.5	1.9		1,034.7	542
Cottonwood			4	2						30.7	31.1	
Total	9,963.4	4,883.8	4,126.8	6,429.5	5,650.8	3,338.7	872.7	2,348.8	320.9	46.8	37,907.2	2,527
Pole, seedling, and sapling stands:												
Western white pine	382.8	10.2	223.4	217.6	204.3	91.0	74.7	28.1	47.9		1,278.9	268
Ponderosa pine	13.5	794.0	114.5	296.9	38.5	2.7			91.8		1,476.9	
Larch-Douglas-fir	32.0	17.6	261.4	203.8	49.0	38.0	7.2	27.3	59.4		785.7	
Hemlock-grand fir	1.7	.7	5.4	14.8	49.8	3.1	4.4	3.1	.6		83.6	
Douglas-fir	1.5	5.8	7.7	81.8	11.0	.4	.7	1.8	3.5		114.2	
Engelmann spruce	2.1		3.0	3.7	6.6	2.9	1.2	44.7	3.0		67.0	
Lodgepole pine	6.0	13.3	28.9	15.8	36.6		.1	67.1	437.3		604.9	
Western red cedar	.1		.5	2	.6	3.4		.5			7.1	3
Cedar-grand fir	4.3	7.1	10.7	33.7	56.7	25.6	1.3	8.4	1.2		147.9	37
Cottonwood										.5	.5	
Total	444.0	848.7	655.5	988.3	453.1	167.1	89.4	180.8	642.5	.5	4,869.9	308
All stands	10,407.4	5,732.5	4,782.3	7,417.8	6,103.9	3,505.8	962.1	2,529.6	963.4	47.3	42,777.1	2,835

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] Includes some alpine fir.

[3] Includes the volume in cedar poles shown in pieces in last column (180 board feet per piece in saw-timber stands, 50 board feet per piece in pole, seedling, and sapling stands).

[4] Includes some mountain hemlock.

[5] Includes some white bark pine.

TABLE 16.—*Saw-timber volume (Scribner log rule) in commercial saw-timber stands by county and ownership,*[1] *northern Idaho*

[In million board feet, i. e. 000,000 omitted.]

ALL SPECIES

Forest district and county	Large private	Small private	State	County	Indian reservation	Public domain	Water-power reservation	Total	National forest	Total, all ownerships
Sandpoint:										
Boundary	668.1	97.8	444.5	4.1	1.7	12.4	0.1	1,228.7	1,312.9	2,541.6
Bonner	560.9	106.4	756.7	24.1		13.1		1,461.2	1,195.9	2,657.1
Total	1,229.0	204.2	1,201.2	28.2	1.7	25.5	.1	2,689.9	2,508.8	5,198.7
Coeur d'Alene-St. Joe:										
Kootenai	227.6	186.1	69.6	21.2		38.8		543.3	895.0	1,438.3
Benewah	927.4	194.6	81.7	34.7	20.7	33.9		1,293.0	102.7	1,395.7
Shoshone	1,977.0	309.1	435.7	49.6		156.4	2.8	2,930.6	3,938.7	6,869.3
Total	3,132.0	689.8	587.0	105.5	20.7	229.1	2.8	4,766.9	4,936.4	9,703.3
Clearwater:										
Latah	661.0	332.1	94.0	6.3		2.1		1,095.5	215.2	1,310.7
Clearwater	5,920.5	1,117.5	3,235.7	29.6	35.8	110.9	7.7	10,457.7	2,681.7	13,139.4
Total	6,581.5	1,449.6	3,329.7	35.9	35.8	113.0	7.7	11,553.2	2,896.9	14,450.1
Winchester:										
Lewis	68.6	142.4	2.6	1.4	12.3	5.8		233.1		233.1
Nez Perce	72.3	342.8	37.0	7.0	15.2	9.8		484.1		484.1
Total	140.9	485.2	39.6	8.4	27.5	15.6		717.2		717.2
Idaho	632.9	904.4	342.3	5.4	5.7	70.1	267.9	2,228.7	5,669.2	7,897.9
Total, all counties	11,716.3	3,733.2	5,499.8	183.4	91.4	453.3	278.5	21,955.9	16,011.3	[2] 37,967.2

WESTERN WHITE PINE ONLY

Forest district and county	Large private	Small private	State	County	Indian reservation	Public domain	Water-power reservation	Total	National forest	Total, all ownerships
Sandpoint:										
Boundary	144.5	5.3	146.7	.1		.6		297.2	215.8	513.0
Bonner	144.4	7.9	263.7	2.3		2.8		421.1	319.1	740.2
Total	288.9	13.2	410.4	2.4		3.4		718.3	534.9	1,253.2
Coeur d'Alene-St. Joe:										
Kootenai	48.5	16.0	12.7	2.9		4.0		84.1	297.4	381.5
Benewah	199.0	15.1	13.2	4.3		4.7		236.3	21.7	258.0
Shoshone	735.1	66.5	162.5	9.2		32.6	.6	1,006.5	1,345.4	2,351.9
Total	982.6	97.6	188.4	16.4		41.3	.6	1,326.9	1,664.5	2,991.4
Clearwater:										
Latah	127.9	14.2	22.2	.1				164.4	24.0	188.4
Clearwater	2,683.6	235.8	1,199.2	4.8		42.8	.3	4,166.5	1,121.0	5,287.5
Total	2,811.5	250.0	1,221.4	4.9		42.8	.3	4,330.9	1,145.0	5,475.9
Winchester:										
Lewis	.1							.1		.1
Total	.1							.1		.1
Idaho	10.9	1.0	1.2					7.3	20.4	222.4	242.8
Total, all counties	4,094.0	361.8	1,821.4	23.7		87.5	8.2	6,396.6	3,566.8	9,963.4

[1] Ownership data, 1934, adjusted to forest areas as of January 1, 1939.

[2] Includes the volume in cedar poles amounting to 1,128.7 million board feet log scale.

TABLE 17.—*Cubic volume on commercial forest land* [1] *by species, tree size, and stand class, northern Idaho*

[In million cubic feet, i. e., 000,000 omitted]

Species	Saw-timber stands			Pole stands			Seedling and sapling stands			All stands		
	Saw-timber trees [2]	Cord-wood trees [3]	Total	Saw-timber trees [2]	Cord-wood trees [3]	Total	Saw-timber trees [2]	Cord-wood trees [3]	Total	Saw-timber trees [2]	Cord-wood trees [3]	Total
Western white pine	1,811.5	63.1	1,874.6	90.5	331.8	422.3	0.1	60.5	60.6	1,902.1	455.4	2,357.5
Ponderosa pine	800.6	11.9	812.5	160.9	222.5	383.4	3.1	51.7	54.8	964.6	286.1	1,250.7
Western larch	750.3	119.9	870.2	128.0	461.0	589.0	.7	84.2	84.9	879.0	665.1	1,544.1
Douglas-fir	1,190.7	160.5	1,351.2	189.7	647.8	837.5	1.5	113.7	115.2	1,381.9	922.0	2,303.9
Grand fir [4]	1,108.0	174.6	1,282.6	91.9	259.5	351.4	.7	47.7	48.4	1,200.6	481.8	1,682.4
Western redcedar [5]	692.8	55.6	748.4	40.7	92.0	132.7	2.4	18.4	20.8	735.9	166.0	901.9
Western hemlock [6]	171.1	19.9	191.0	19.0	81.1	100.1		13.3	13.3	190.1	114.3	304.4
Engelmann spruce	427.1	38.1	465.2	37.0	85.2	122.2	.7	14.8	15.5	464.8	138.1	602.9
Lodgepole pine [7]	62.9	8.1	71.0	157.0	143.0	300.0	4.1	46.4	50.5	224.0	197.5	421.5
Black cottonwood	8.4	.2	8.6	.1	3.3	3.4	(8)	(8)	(8)	8.5	3.5	12.0
Total	7,023.4	651.9	7,675.3	914.8	2,327.2	3,242.0	13.3	450.7	464.0	7,951.5	3,429.8	11,381.3

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] For white pine, ponderosa pine, western redcedar, lodgepole pine, and cottonwood, all trees over 11.0 inches d. b. h. For all other species, trees over 13.0 inches d. b. h.

[3] The volume of cordwood trees includes all sound wood in living trees 5.0 inches d. b. h. to saw-timber size from stump to a 4-inch top, excluding bark of all species and limbwood of conifers.

[4] Includes some alpine fir.

[5] Includes the volume in cedar poles.

[6] Includes some mountain hemlock.

[7] Includes some white bark pine.

[8] Volume is included with that in pole stands.

TABLE 18.—*Average annual cutting drain* [1] *from the green-timber resource by species and products, northern Idaho*

SAW-TIMBER TREES, IN MILLION BOARD FEET, SCRIBNER LOG RULE [2]

Species	Sawlogs	Pulpwood	Fuelwood	Shingles	Hewed ties	Poles and piling	Posts	Mine timbers	Total
Western white pine	350.7		(3)						350.7
Ponderosa pine	69.5		26.4					0.3	96.2
Western larch	19.3		16.4		0.2	0.3		3.1	39.3
Douglas-fir	23.5		26.3		.2	.2		3.7	53.9
Grand fir	11.8	8.0	.4						20.2
Western redcedar	3.5			1.5		44.2	3.8		53.0
Western hemlock	.9	.2	1.7						2.8
Engelmann spruce	3.4	2.0							5.4
Lodgepole pine	(3)								(3)
Black cottonwood	(3)		2.9						2.9
Total	482.6	10.2	74.1	1.5	.4	44.7	3.8	7.1	624.4

SAW-TIMBER AND CORDWOOD TREES, IN THOUSAND CUBIC FEET [4]

Western white pine	63,760		(5)						63,760
Ponderosa pine	11,390		5,150				10	60	16,610
Western larch	3,510		3,810		70	50	230	630	8,300
Douglas-fir	4,350		6,150		60	30	160	760	11,510
Grand fir	2,310	1,570	70						3,950
Western redcedar	700			310		9,820	1,000		11,830
Western hemlock	180	40	310					20	550
Engelmann spruce	620	360						(5)	980
Lodgepole pine	(5)		690						690
Black cottonwood	(6)		820						820
Total	86,820	1,970	17,000	310	130	9,900	1,400	1,470	119,000

[1] Sawlog drain 1935-38, inclusive. Minor products approximately 1925-34.

[2] Includes the board-foot volume from stump to a commercial top.

[3] Less than 0.1 million board feet.

[4] Includes the cubic-foot volume from stump to a 4-inch top, inside bark, of trees both of saw-timber size and cordwood size.

[5] Less than 20,000 cubic feet.

[6] Includes a small amount of birch.

TABLE 19.—*Average annual cutting and fire drain from the green-timber resource by species and ownership, northern Idaho*

SAW-TIMBER TREES, IN MILLION BOARD FEET, SCRIBNER LOG RULE

Species	Cutting drain [1]			Fire drain [2]		
	National forest	Other land	Total	National forest	Other land	Total
Western white pine	34.3	316.4	350.7	10.6	4.7	15.3
Ponderosa pine	1.4	94.8	96.2	4.8	4.1	8.9
Western larch	2.5	36.8	39.3	5.8	4.6	10.4
Douglas-fir	2.7	51.2	53.9	13.2	6.1	19.3
Grand fir	.6	19.6	20.2	13.7	3.0	16.7
Western redcedar	5.9	47.1	53.0	6.2	5.0	11.2
Western hemlock	.4	2.4	2.8	2.0	.8	2.8
Engelmann spruce	.9	4.5	5.4	4.7	.5	5.2
Lodgepole pine	[3]		[3]	.7	.4	1.1
Black cottonwood		2.9	2.9			
Total	48.7	575.7	624.4	61.7	29.2	90.9

SAW-TIMBER TREES AND CORDWOOD TREES, IN MILLION CUBIC FEET

Western white pine	6.2	57.6	63.8	2.1	1.2	3.3
Ponderosa pine	.2	16.4	16.6	.8	.7	1.5
Western larch	.4	7.9	8.3	1.5	1.6	3.1
Douglas-fir	.5	11.0	11.5	3.2	1.9	5.1
Grand fir	.1	3.8	3.9	3.2	.9	4.1
Western redcedar	1.3	10.5	11.8	1.2	.6	1.8
Western hemlock	.1	.5	.6	.5	.2	.7
Engelmann spruce	.2	.8	1.0	1.0	.2	1.2
Lodgepole pine	[4]	.7	.7	.3	.2	.5
Black cottonwood		.8	.8			
Total	9.0	110.0	119.0	13.8	7.5	21.3

[1] Lumber 1935–38, other products approximately 1925–34.

[2] 1931–37, inclusive.

[3] Less than 0.1 million board feet.

[4] Less than 50 thousand cubic feet.

[5] Includes a small amount of birch.

TABLE 20.—*Current annual increment on commercial [1] conifer forest stands by species and ownership, northern Idaho.*

Species	Saw-timber trees—Scribner log rule			Saw-timber trees and cordwood trees [2]		
	National forest	Other land	Total	National forest	Other land	Total
	Million board feet	*Million board feet*	*Million board feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Western white pine	62.4	102.5	164.9	19.0	24.5	43.5
Ponderosa pine	20.4	72.3	92.7	4.2	16.9	21.1
Western larch	34.4	49.3	83.7	14.2	17.7	31.9
Douglas-fir	49.5	76.8	126.3	19.3	25.5	44.8
Grand fir	33.3	51.0	84.3	11.6	13.9	25.5
Western redcedar	11.7	15.6	27.3	4.2	4.6	8.8
Western hemlock	5.0	4.3	9.3	2.9	2.5	5.4
Engelmann spruce	13.9	10.5	24.4	4.4	3.0	7.4
Lodgepole pine	11.0	11.1	22.1	5.4	4.7	10.1
Mountain hemlock	[3]	[3]		.1		.1
Alpine fir	1.0	.4	1.4	.4	.3	.7
Total	242.6	393.8	636.4	85.7	113.6	199.3

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] Growth in cubic feet is shown for the portion of the stem between stump and a 4-inch top diameter inside bark of all trees larger than 5.0 inches d. b. h. The total current annual increment for all trees 0.6 inches d. b. h. and larger is 266.5 million cubic feet. Of this, 115.7 million cubic feet is national-forest timber growth.

[3] Less than 0.1 million board feet.

TABLE 21.—*Saw-timber volumes (1939), annual increment, and annual drain (cutting and fire) on commercial forest land,* [1] *northern Idaho (lumber tally)*

[In million board feet, i. e., 000,000 omitted]

Item	Western white pine	Ponderosa pine	Western larch	Douglas-fir	Grand fir [2]	Western red cedar	Western hemlock [3]	Engelmann spruce	Lodgepole pine [4]	Black cottonwood	All species
Saw-timber volume [5]	12,697.1	6,649.7	5,738.8	8,901.4	7,324.7	4,206.9	1,154.5	3,035.6	1,156.1	37.5	50,902.3
Annual increment [5]	201.2	107.5	100.4	151.6	102.8	32.8	11.2	29.3	26.5	(6)	763.3
Annual drain [5]	446.5	121.9	59.6	87.8	44.3	77.0	6.7	12.7	1.4	3.4	861.3

[1] Land capable of producing commercial timber and economically accessible, now or prospectively, and not reserved from cutting.

[2] Includes some alpine fir.

[3] Includes some mountain hemlock.

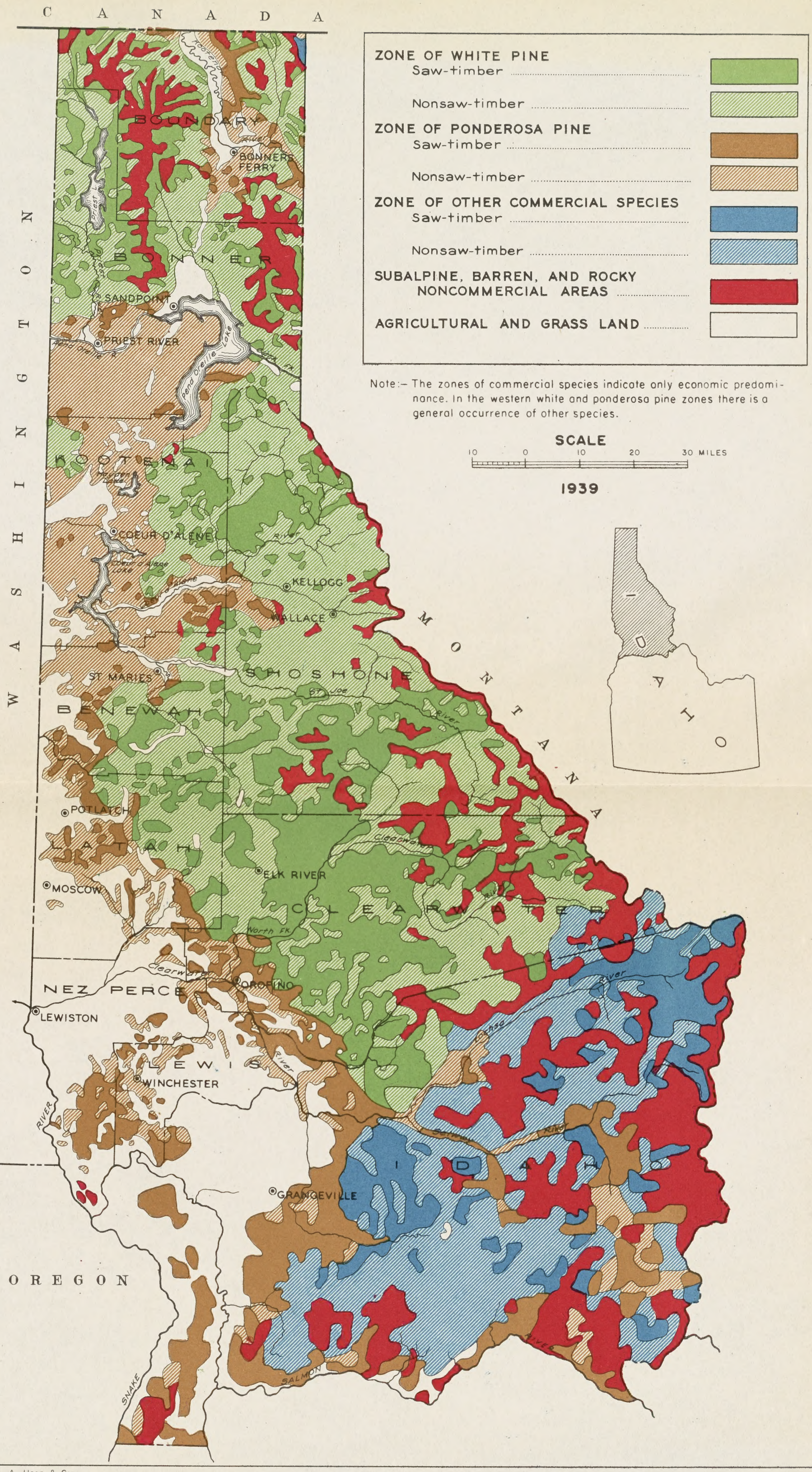
[4] Includes some white bark pine.

[5] Includes volume in both saw-timber and cordwood stands.

[6] Increment is not calculated for black cottonwood.

C A N A D A

ZONE OF WHITE PINE



ZONE OF WHITE PINE
- Saw-timber
- Nonsaw-timber

ZONE OF PONDEROSA PINE
- Saw-timber
- Nonsaw-timber

ZONE OF OTHER COMMERCIAL SPECIES
- Saw-timber
- Nonsaw-timber

SUBALPINE, BARREN, AND ROCKY NONCOMMERCIAL AREAS

AGRICULTURAL AND GRASS LAND

Note:— The zones of commercial species indicate only economic predominance. In the western white and ponderosa pine zones there is a general occurrence of other species.

SCALE

10 0 10 20 30 MILES

1939

Lith. A. Hoen & Co.,